APRIL 27, 1944

American Machinist

TECHNOLOGY DEPT

What's Ahead in Metal Finishing?

•

Special Fixtures for Making Gun Mounts

•

Charts Simplify Punch Press Loading

•

Furnace Trays Designed for Longer Life

•

Soluble Oil System Pays in Two Months

LET *Precisioneering* HELP YOU!

WHEN YOU PLAN production of your post-war products—let Heald Precision Engineers "sit in". They can place before you many war-born ideas that spell faster, cheaper production—better products.

How to turn out the parts you make, faster, through the use of special tooling and by eliminating unnecessary machining operations...

How to achieve greater accuracy—and to substantially cut down the number of rejects...

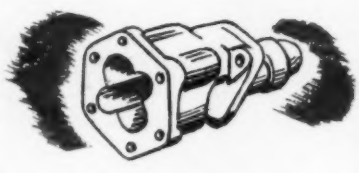
How to achieve precision machining standards which you might have heretofore considered impossible...

These are just a few of the many questions which Heald *Precisioneers* can help you answer.

The Heald staff of over 250 Precision Engineers—specialists in precision boring, turning, facing, grinding—are at your service.

THE HEALD MACHINE CO.
WORCESTER 6, MASS.

An Example of
PRECISIONEERING RESULTS



Formerly, these cast iron automotive pump bodies were faced by grinding. Not satisfactory. When the 3¼" diameter was precision finished 3-at-a-time, exactly flat, by facing on a Heald No. 44 Bore-matic, production increased 127%.

HEALD *Precision Engineering*

Internal and Surface Grinding Machines • Bore-matic Precision Finishing Machines

TECHNOLOGY DEPT.

American Machinist

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PRINTED IN U. S. A.

American Machinist Chips

Metal Finishing . . . In this issue the editors of *American Machinist* present the second in their new series of feature articles, "Metal-Working Tomorrow." This one, on Metal Finishing, rounds up the newest and best in finishing equipment, materials and practices and tries to evaluate the effect of these improvements on the manufacture of peacetime products. An attempt has been made to cover broadly the whole range of organic and inorganic finishes — together with the very important phase of metal cleaning and other preliminary processes.

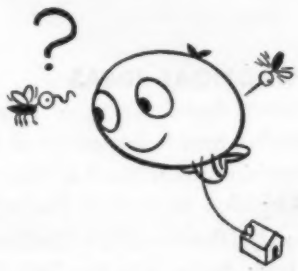
As with the previous section, "What's Ahead in Heat-Treating," this article is the result of intensive study and first-hand reporting by *American Machinist's* crew of traveling editors. And as with the heat-treating article, reprints are available at 10c per each.

Textile Machinery . . . A survey by McGraw-Hill's *Textile World* shows that the spinning and weaving industry is much concerned over post-war problems. A poll of textile executives showed that in their minds No. 1 problem was "Maintaining Mutually Satisfactory Relations With Labor" and, of particular interest to Metal-Working, No. 2 problem was "Replacing Worn-Out and Obsolete Buildings, Machines and Equipment."

Stuart W. Cramer, Jr., President of Cramerton Mills, Inc., said, "If we are to do our job properly in the post-war period, it is extremely important that the reconversion of the textile machinery industry start as early and progress as rapidly as the war program permits, and that when new machinery becomes available our domestic mills will have first call upon it."

More Aluminum . . . You may have seen the WPB ruling permitting many industrial articles "essential to the war effort" to be made of aluminum . . . in limited quantities. Automotive trucks and trailers, commercial communication equipment, fire fighting equipment, protective signal and alarm equipment and commercial food and processing machines head a long list of products so favored. Officials stressed that relaxation of civilian production is not contemplated at this time.

The Human Race . . . Noticed the results of a horse race in which a nag named "Marriage" was first by three lengths. We always thought marriage resulted in a tie. (Wow!)



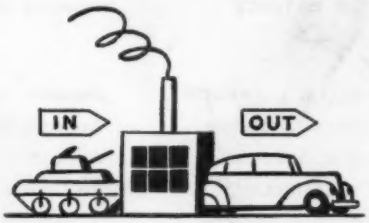
Big Bargain . . . A firm in Baltimore recently advertised a variety of war surplus materials for sale. Included were such items as 80,000,000 washers, two 1941 Cadillac sedans and 50,000 lbs. of mixed nails (slightly oxidized).

What caught our roving eye was an item of "80 New Barrage Ballons." We always wanted a barrage ballon of our very own and are toying with the idea of coating one with fly paper in an attractive tomato-plant design, hoisting it over our Victory garden and using it as a decoy to draw away our annual crop of insect pests.

Your Fin's Worth . . . It was brought to our attention that in 1943 *American Machinist* readers were exposed to 1,767 pages of editorial material. This was over and above the volume of informative advertising which appeared during the same period. That sounds like $5 worth of value in any man's language, and your subscription will buy even more in 1944.

Manpower Job . . . The 58th Annual Report of Westinghouse stated that the company has had to select and train more than 96,000 additional people since 1939. Some 45,000 were trained for new jobs in 1943 alone. Perhaps this is one reason why Westinghouse has ordered such quantities of reprints of our employee training sections "The Tools of Our Trade."

The company also required 2,245 new foremen and supervisors in 1943, with additional executives necessary to organize and plan for the new and increased work.



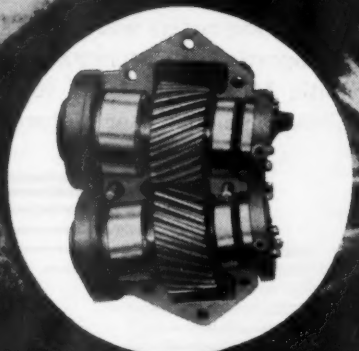
Reverse Output . . . A program of scrapping finished and unfinished war material which would maintain employment in the U. S. until full peacetime production of civilian goods is attained was recently proposed by Max Stern, Manager of the Loma Machine Mfg. Co., Inc., New York.

Mr. Stern says that a sudden Allied victory would leave thousands of tanks, planes, ships and other war necessities in many unfinished stages along production lines. His idea would then be to have "production in reverse." When the assembly lines are halted, the war product would travel back on its production line, taken apart and the components either scrapped or used in making new peacetime products.

Where-to-Buy . . . Our faces are duly red because of the delay in mailing out the new 1944 "Where-to-Buy Directory" offered on this page some time ago. This is by way of a blanket apology to hundreds of readers who ordered and had to wait. The "old gray printing presses, they ain't what they used to be" . . . and we ran into unavoidable hold-ups.

All requests have been filled by now, however, and if you didn't send for your free copy do so and be pleasantly surprised at getting it by return mail.

BEVEL GEAR DRIVES — TO Victory



Gleason-cut angular spiral bevel gears . . . for PT boat V-drives.

SCOURGE OF AXIS SHIPPING

The U. S. Navy's little PT boats have inscribed in the pages of history some of the most dazzling exploits of the war. Whether in the Solomons or along the coast of Italy, these hard-hitting PT's have sent to the bottom the enemy's mightiest cruisers, destroyers, transports.

Through the pounding of heavy seas and against terrific shell fire, these dauntless craft and their indomitable crews have successfully harassed the Axis with their ability to dash in quickly upon an unsuspecting enemy vessel, fire their deadly torpedoes and then get away.

ANGULAR SPIRAL BEVEL GEARS PROVIDE SMOOTH, DURABLE "PT" POWER TRANSMISSION

The bewildering speed, hair-breadth starts and abrupt turns required by these "hit and run" tactics demand a dependable flow of power from the PT's rugged engines to their propellers. Angular Spiral Bevel Gears supply the answer, "taking" the great speeds and sudden, high loads with smoothness and uniformity. Moreover, the use of these angulars permits mounting the motors in the stern of these boats with the most effective distribution of weight and utilization of space. This type of drive arrangement is known as a "V-drive."

CUT ON GLEASON MACHINES

These Angular Spiral Bevels are cut with great accuracy and speed of output on Gleason Spiral Bevel Gear Generators.

This is just one of many examples of the adaptability of bevel gears in transmitting power smoothly and durably no matter what the angle. This war-proven capability of angular bevel gears points the way to new types of power transmission for the world of tomorrow.

GLEASON WORKS

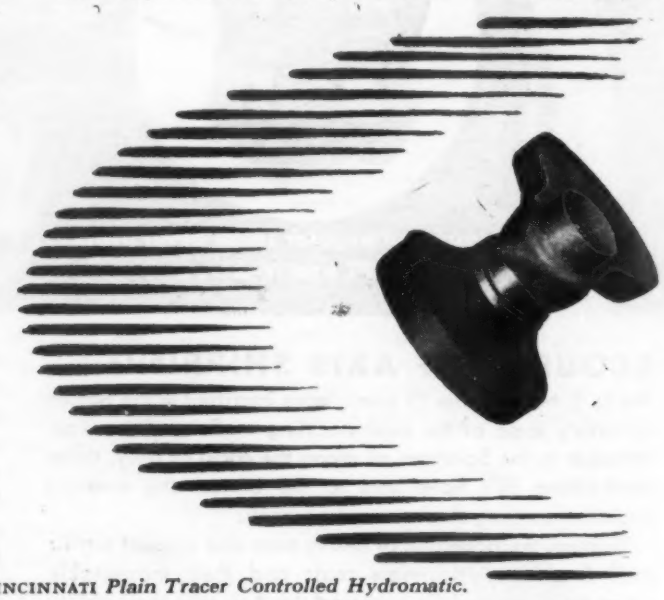
Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.

TRACER CONTROLLED

Get the

CINCINNATI Tracer Controlled Hydromatics profile mill surfaces to the shape of a template, a feature that's unusually desirable now and immediately available for conversion to the manufacture of peacetime products which will require the most advanced methods of production. ¶ In the illustration on the opposite page, the machine profile mills around the center bearing of aircraft engine crankshaft, like this ⌒. The operation consists of rough milling between counterweights. ¶ Two hand-clamping fixtures are used; one is loaded while the part held in the other is milled. This arrangement, together with automatic milling cycles, saves time and assures almost continuous cutting. The table feed is automatically varied to obtain maximum efficiency of metal removal. ¶ You'll find it well worth while to investigate the usefulness of these Milling Machines NOW! The engineers here at Milling Headquarters will be glad to discuss with you the adaptation of CINCINNATI Tracer Controlled Hydromatic Milling Machines to meet your present requirements or your future milling plans.



CINCINNATI *Plain Tracer Controlled Hydromatic.*

Also available in Duplex Model. Catalog M-1295 contains complete specifications on both styles. A copy will be sent on request. Sweet's Catalog File for Mechanical Industries gives a brief description of all CINCINNATI *Milling Machines.*

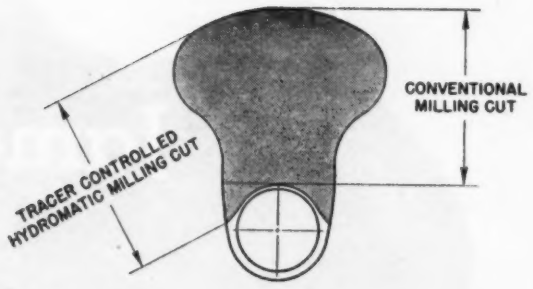
Keep on buying WAR BONDS

THE CINCINNATI MI

MILLING MACHINES

HYDROMATICS

corners too



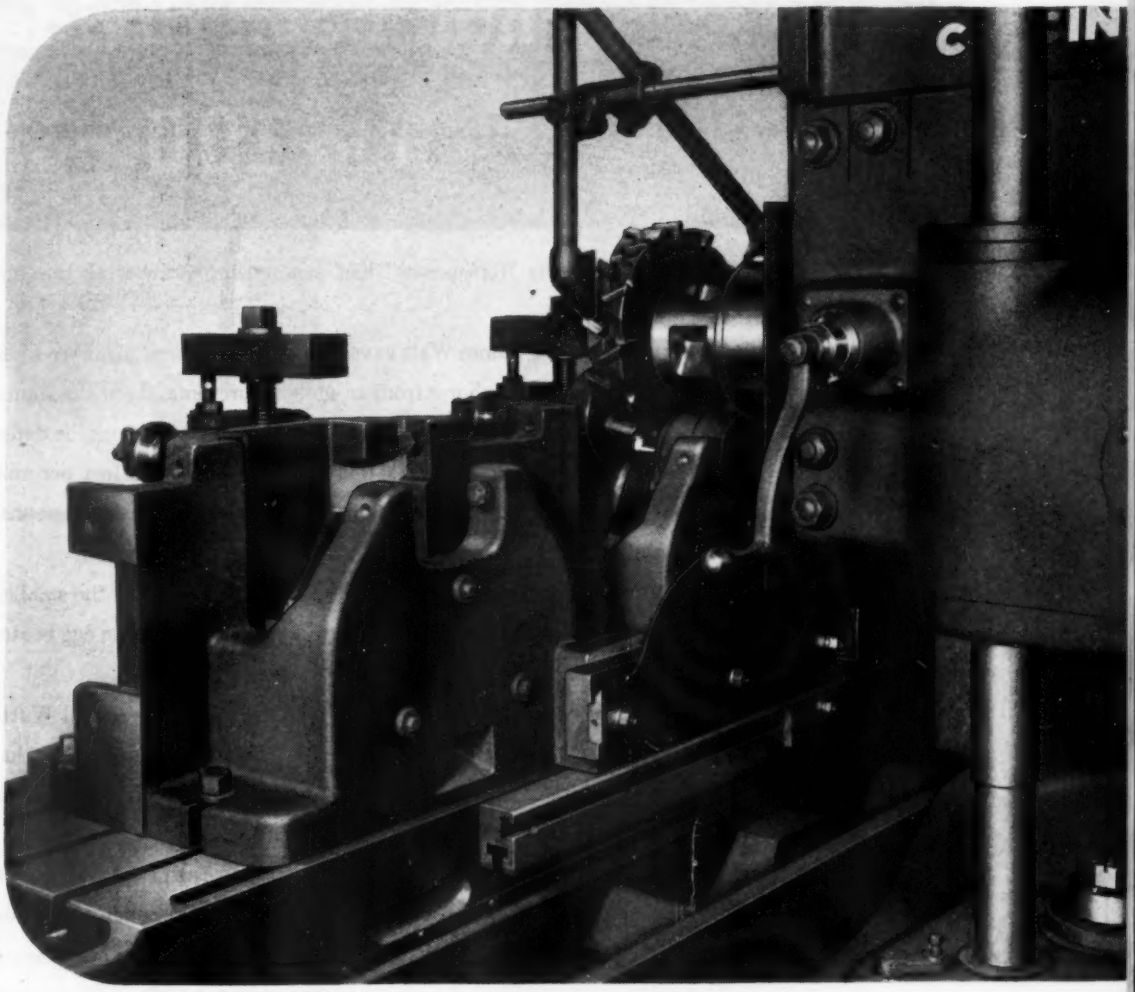


Illustration of part being milled is shown at left. Color indicates milled surfaces. The machine (tooled up by CINCINNATI engineers) is a 5-48 Plain Tracer Controlled Hydromatic equipped with variable feed attachment; high headstock for increased vertical range; long quill and spindle for extended cross range; and inserted tooth cutter, 13" diameter by $3\frac{1}{16}$" wide.

CINCINNATI

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

James Watt's horse has been divided into 100 parts

For centuries "One Horsepower" had meant simply the work that one horse could do.

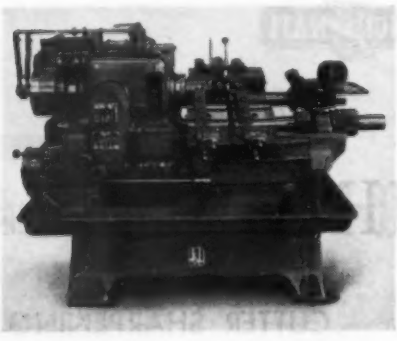
Then, 175 years ago, James Watt gave the term its modern meaning when he borrowed a husky dray horse from an obliging brewer and put the animal to the test. By means of tackles and weights, and some paper work, he determined that the horse could raise 1000 pounds at the rate of 33 feet per minute. So we got our familiar equation, ... 1 horsepower = 33,000 foot pounds per minute.

This was a lot of power—ideal for draught work—useless for the smaller, more tedious tasks such as operating a razor, a needle, a fan or an egg beater. Only a visionary would have thought of this.

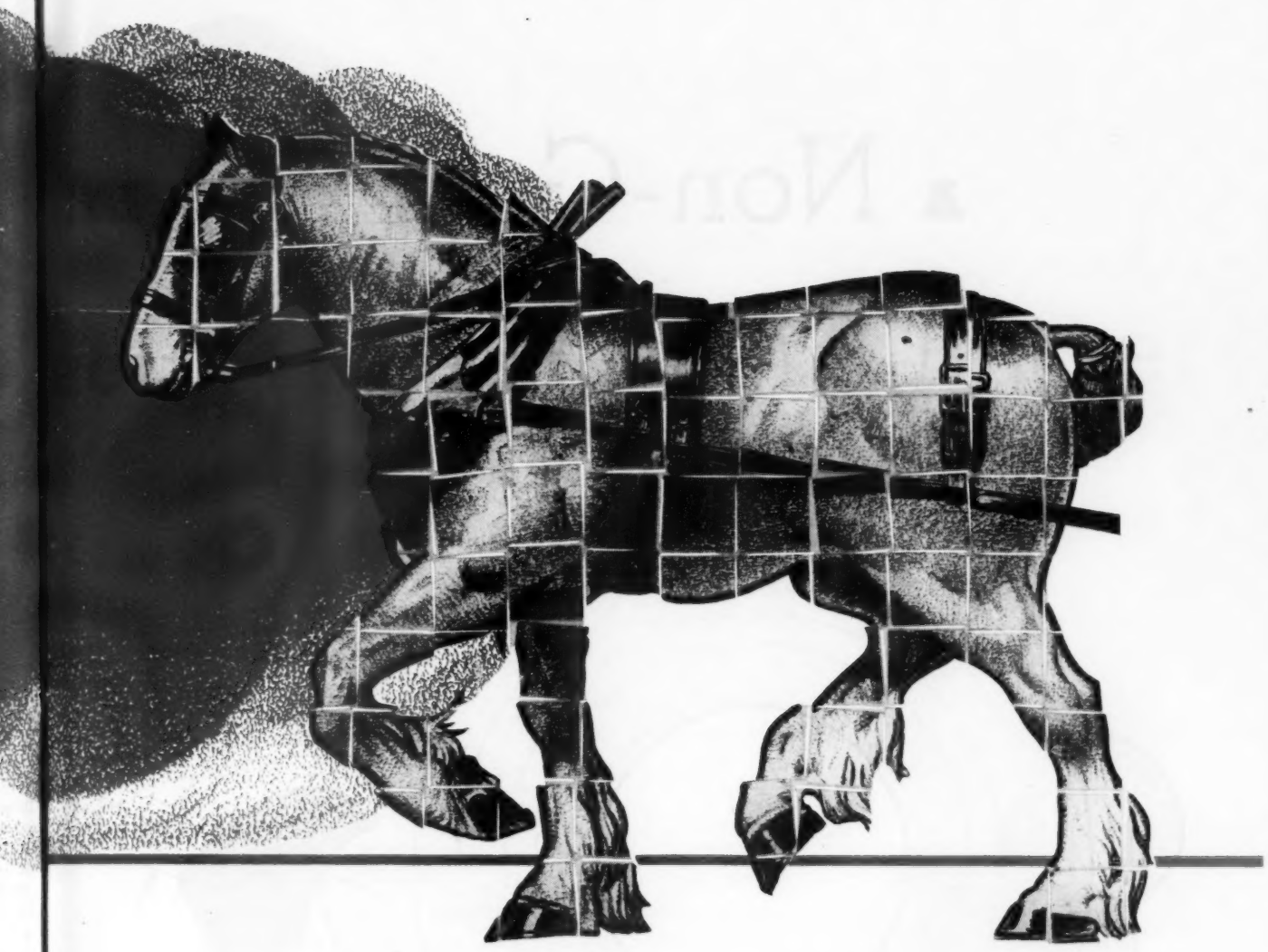
But, the advent and development of electrical power condensed Watt's horse and divided him into a hundred tiny fractions. Power far greater than his is now packed into less than a cubic foot, and fractions of him fit neatly into the palm of your hand.

Tomorrow, these tiny, useful fractions of horsepower will take over more and more of our trivial, but tedious, work. For, today, men with ideas have the help of the makers of modern, fast, accurate machine tools.

For over a century, Jones & Lamson engineers have been helping our most progressive manufacturers to put their newest ideas into profitable production. This accumulation of experience and knowledge is at your service today.

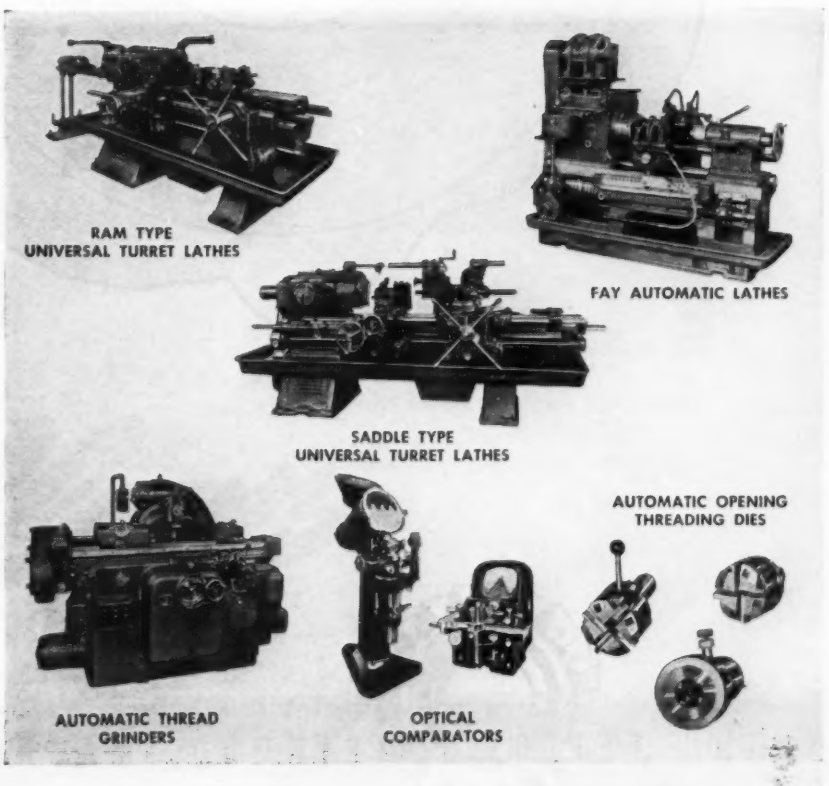


A Jones & Lamson Fay Automatic Lathe tooled to machine the frame for a small electric motor. Fay Automatic Lathes are used extensively to machine parts for all kinds of domestic appliances, that add to our comfort and lighten our work.



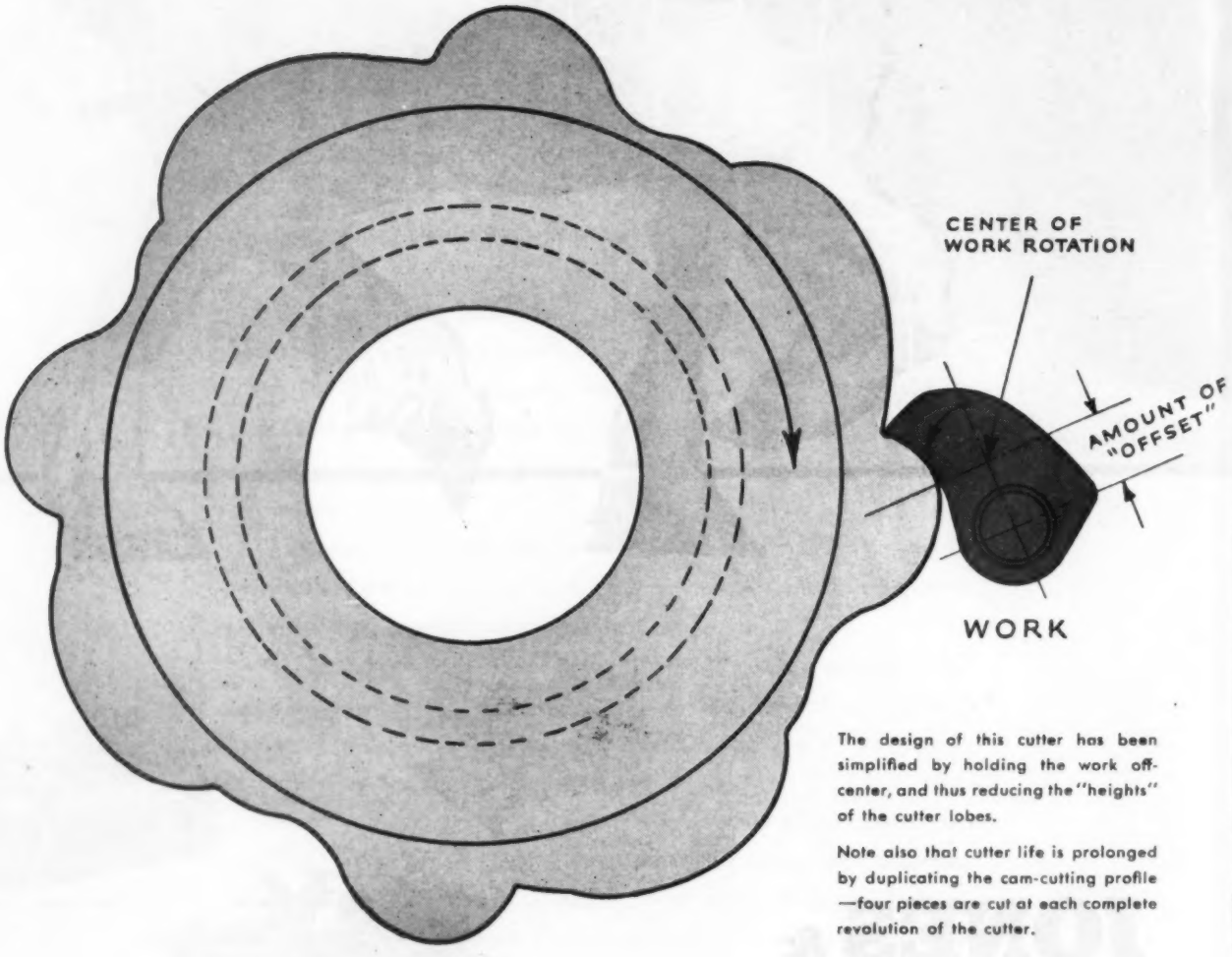
JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.



A Non-Gear PART LIKTH

...IS AN IDEAL JOB OR



The design of this cutter has been simplified by holding the work off-center, and thus reducing the "heights" of the cutter lobes.

Note also that cutter life is prolonged by duplicating the cam-cutting profile —four pieces are cut at each complete revolution of the cutter.

THE FELLOWS METHOD... MACHINES AND TOOLS FO ALL

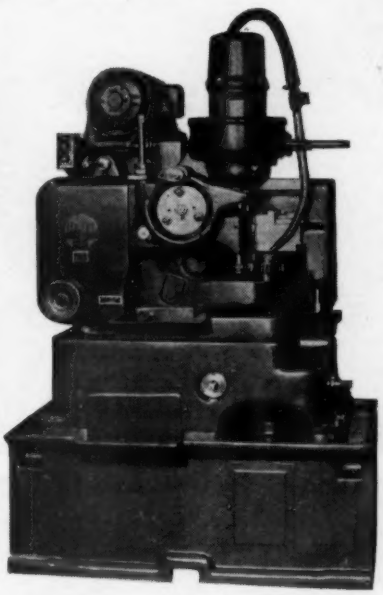
THIS OR THE Gear Shaper

The exact form of this or any other irregularly-contour part can easily be embodied in a ***Fellows Cutter.*** Once that is done, accurate production at high speed is a certainty.

Fellows skill at designing and supplying such special cutters is a prime factor in reducing the cost of production. To achieve comparable high-precision results by any other method is likely to cost several times as much.

And, bear in mind that the work is done on a ***standard Gear Shaper.*** Once the production run of this special part is completed, the machine awaits only a change of cutters and work outfits or fixtures to produce some other special part; or gears, sprockets, splines, etc.

For other examples of the Gear Shaper versatility, write for our 64-page general catalogue, "The Fellows Method" — The Fellows Gear Shaper Company, Springfield, Vermont — Or 640 West Town Office Bldg., Chicago 12, Illinois or 616 Fisher Bldg., Detroit 2, Michigan.



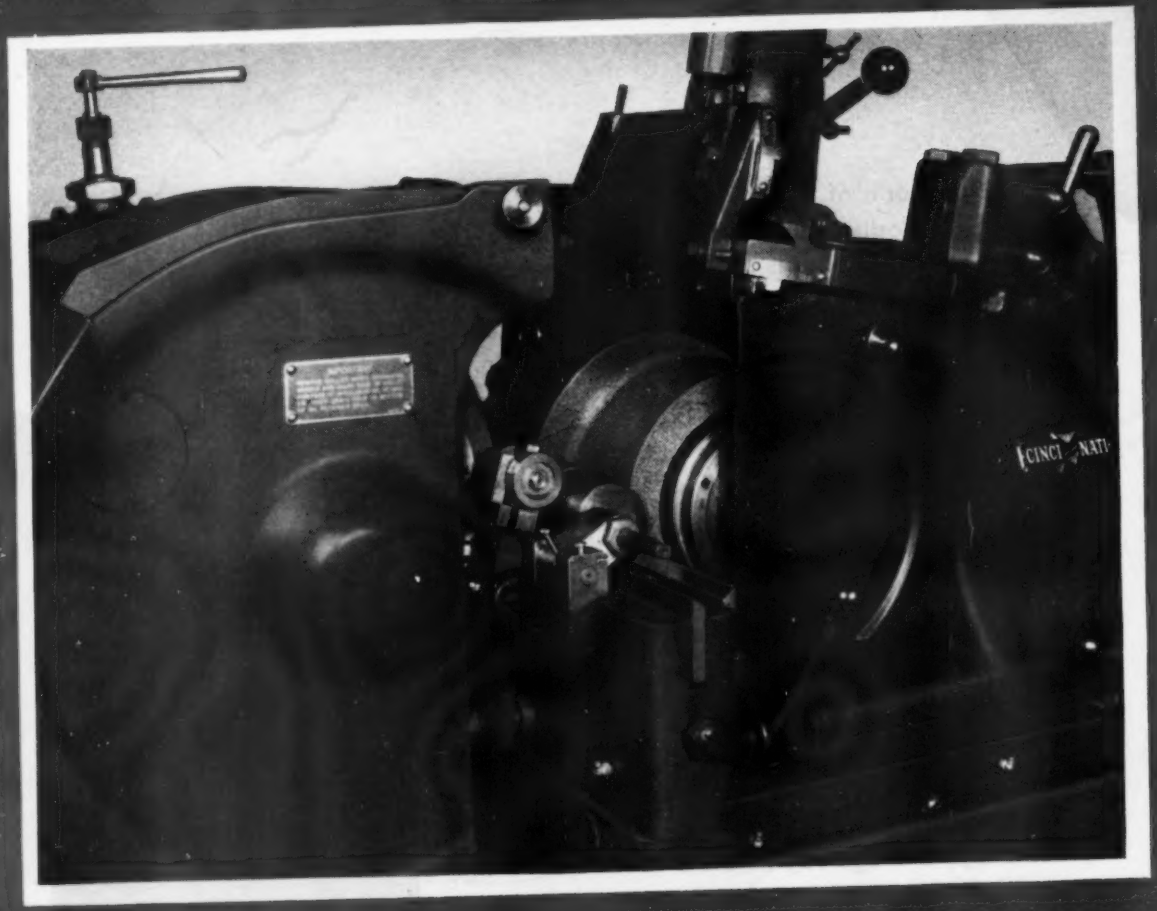
7-type Fellows High-Speed Gear Shaper

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

OFFSET

CENTERLESS GRINDING



Special Infeed Work Rest with hold-down roller arrangement for offset centerless grinding. The machine is a Cincinnati No. 2 Centerless

Keep on buying
WAR BONDS

CINCINNATI G

CINC

CENTER TYPE GRINDING MACHINES

CENT

CINCINNATI

with this equipment . . .

ANOTHER EXAMPLE OF CINCINNATI CENTERLESS KNOW-HOW!

To handle parts requiring an *"offset" grinding operation, this CINCINNATI No. 2 Centerless is equipped with a special 8" Infeed Work Rest featuring hand ejector, spring pressure hold-down rollers, two work blades and retracting end stop. The machine is also equipped with Hydraulic Profile Truing Attachment over the grinding and regulating wheels. ¶ When offset parts are centerless ground, this setup has two advantages: 1) The hold-down roller presses the part against the regulating wheel, maintaining contact and increasing the driving force. 2) It prevents any tendency of the part to cock between the wheels because of the grinding pressure being concentrated at one end. ¶ If your present operations or future plans call for grinding a wide variety of parts in various sizes, shapes or weights, metals or metal substitutes, the engineers here at Grinding Headquarters will be glad to discuss CINCINNATI grinding equipment with you. Or if you have any problem involving either centerless or centertype grinding, you will be wise to depend upon the know-how of CINCINNATI engineers.

** "Offset" grinding on a CINCINNATI Centerless Machine means that the grinding wheel merely grinds a narrow section at one end of the part. The greater portion, or the entire length of the part, contacts the regulating wheel to assure adequate driving force.*

At the right is a CINCINNATI No. 2 Centerless Grinding Machine. Catalog G-456-1 gives complete details and specifications. Copy will be sent on request. For a brief description of all CINCINNATI Grinding Machines, look in Sweet's Catalog File for Mechanical Industries.

GRINDERS INCORPORATED

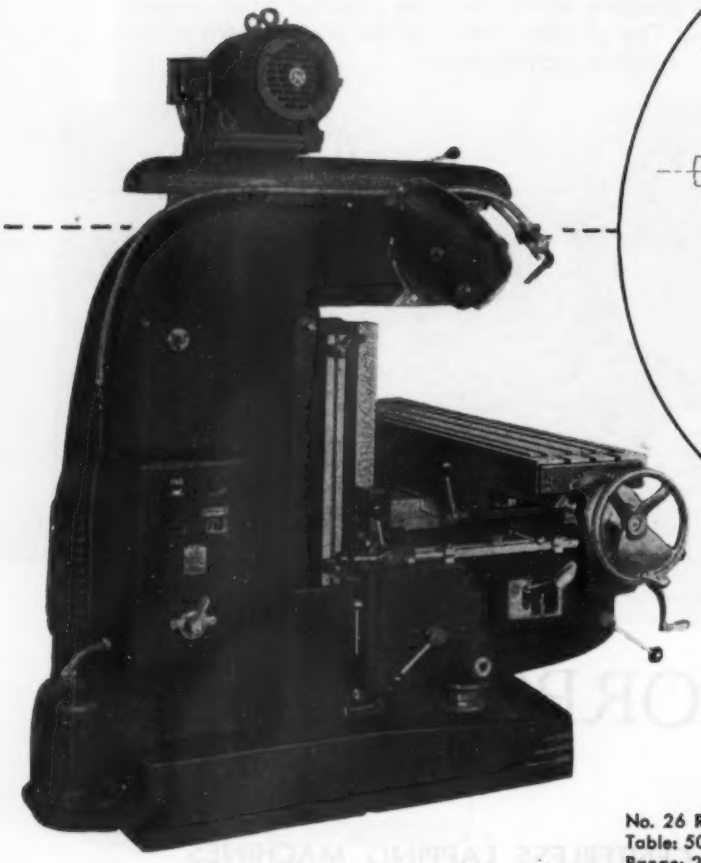
CINCINNATI 9, OHIO, U. S. A.

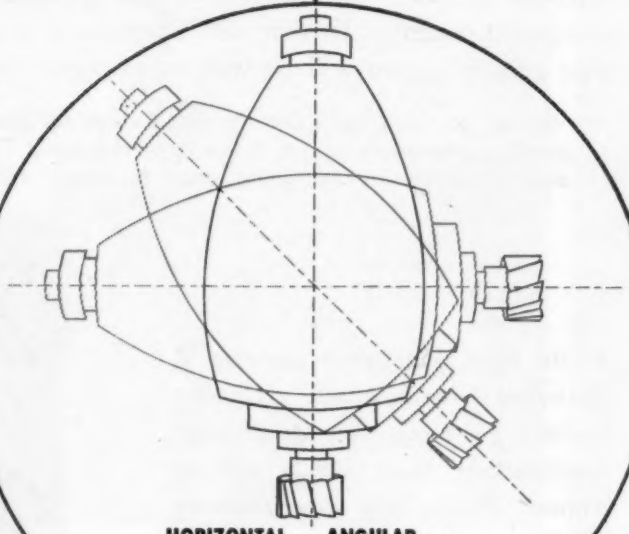
CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Van Norman

Ram Type Universal

Milling Machines





HORIZONTAL . . . ANGULAR . . . VERTICAL MILLING

One Van Norman Ram Universal Miller gives You the work range of several types of millers.

SPECIFICATIONS:

No. 26 Ram Type Universal Miller
Table: 50" x 12"
Range: 28" longitudinal, 12" across, 18" vertical
18 Speeds: 30 to 1500 r.p.m.
18 Feeds: 3/8" to 32"

Vertical Milling—In the illustration at right, the operator is vertical milling a recess in the workpiece.

Angular Milling—Here, the operator is milling a "V" in the workpiece. Note that the set-up of the work is in the original position.

Horizontal Milling—The operator is completing the job with a face milling operation. One work set-up and simple changes of the versatile cutterhead and sliding ram enables the operator to carry most jobs through to completion on a Van Norman Ram Type Universal Miller.

Van Norman Ram Type Universal Milling Machines materially reduce time-wasting reset-ups and cut idle time by as much as 50%.

Here's how.—By simply changing the position of the adjustable cutterhead from horizontal to angular or vertical position . . . you can perform most milling operations on a particular workpiece without a single change of the original set-up. Not only does the adjustable cutterhead enable the operator to complete a job in a shorter time, but because the workpiece stays "put", errors that often accompany work reset-ups are eliminated.

In addition, such Van Norman advantages as directional front and rear controls of all power feeds, large, easy-to-read dials, the extreme ruggedness of the column, ram, saddle and knee assemblies . . . all assure accuracy, economy and maximum production.

THE VAN NORMAN COMPANY, SPRINGFIELD 7, MASS.

"It pays to Van Normanize"

The LANDMACO Threading Machine is a precision tool capable of handling many threading operations much more economically than the heretofore slower and therefore more expensive methods.

It has many new and exclusive features which combine to assure the greatest possible degree of accuracy, ease of operation and flexibility in making set-up changes.

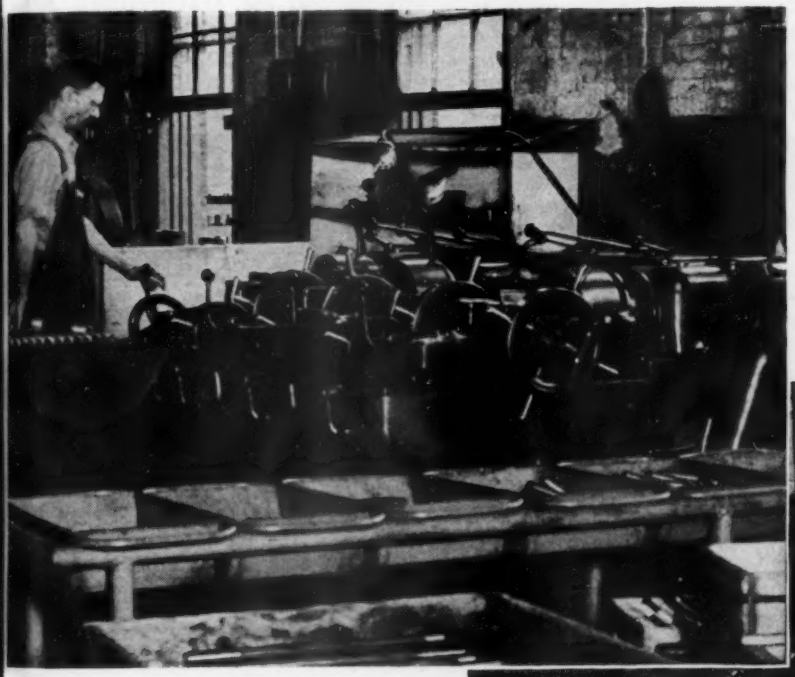
LANDIS MACHINE CO.

THREADING MACHINES · COLLAPSIBLE TAPS · PIPE THREADING MACHINERY

Cost Still Counts

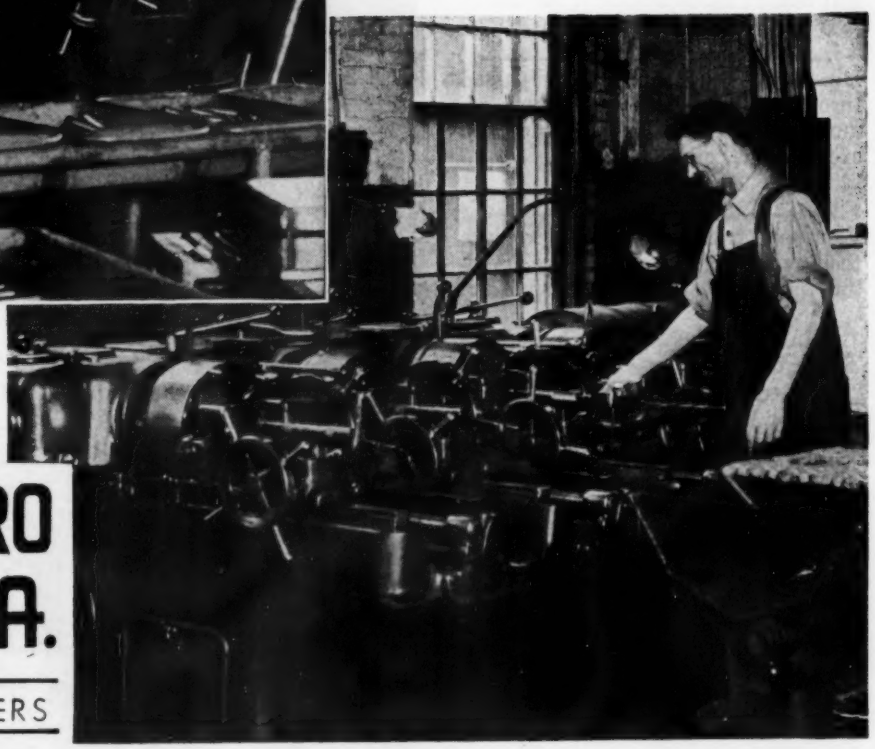
THE LANDMACO THREADING MACHINE ASSURES MINIMUM OPERATING COSTS

The Landmaco Threading Machine is the preference in most railroad shops for threading staybolts, taper head crown bolts, header bolts, etc.—First, because the machine is easily set up—efficient for short run jobs. Second, it is geared for high threading speeds assuring maximum production. Third, the Landmaco employs the Landis long life Tangential Chaser which reduces tool cost to a minimum by producing more threads per grind and innumerably more threads per set of chasers.



The above facts have been proven in hundreds of installations. May we show you why the Landmaco Threading Machine can be profitably employed on your threading operations.

Write for Bulletin No. H-75



WAYNESBORO PENNA. U.S.A.

DIE HEADS · CHASERS

The world's largest magnesium sheet and strip mill has recently gone into production.

Synthetic sapphires and rubies for the jeweled bearings of instruments and for spray nozzles, gages and spinnerets cost from three to six cents per carat while diamonds for this purpose cost about three dollars per carat. The making of these is an American war baby with a future.

NE alloys now make up as much as 20% of the tonnage of steel for aircraft.

A way has been found to put the "flags" (characteristic of natural bristles) on the ends of synthetic bristles for use in paint brushes.

The American chemical industry promises that it will employ more workers after the war than it did before.

Bituminous Coal Research, Inc., supported by the industry, has announced a $2,500,000 program, covering five years, with improvement in the use of soft coal as its object.

Dip-painted parts are being passed through an electrical field which removes the "tear-drop" in which the excess paint collects.

Electronic traffic control may replace the familiar signs and lights by signalling the driver through his dash radio.

The strongest natural fiber is Ramie, cultivated in Egypt 4,000 years ago. It is now being grown in this country and, if practical processing methods can be devised, it is expected to appear among our new textiles.

The new Orthicon camera has an "eye" composed of 400,000 pieces of light-sensitive silver which store voltage proportional to the light cast on them. It will be used in television and is said to be ten times as efficient as the iconoscope previously used.

Photo-electric cells check hand grenades at the rate of 4,000 per hour. When a defective unit appears on the conveyor, the mechanism rings a bell, lights a lamp, puts a dab of paint on the grenade, and makes a mark on a chart.

A new process for drying the paint on army tanks does the work in four minutes while the operator drives the tank through the "oven."

The use of the thyratron tube as a rectifier makes possible the use of an A. C. current supply to drive D. C. motors, the advantage being in very exact control of speed.

Extremes of temperatures encountered in flying have made necessary the development of new and better cements to replace the Canada balsam formerly used in the making of lenses.

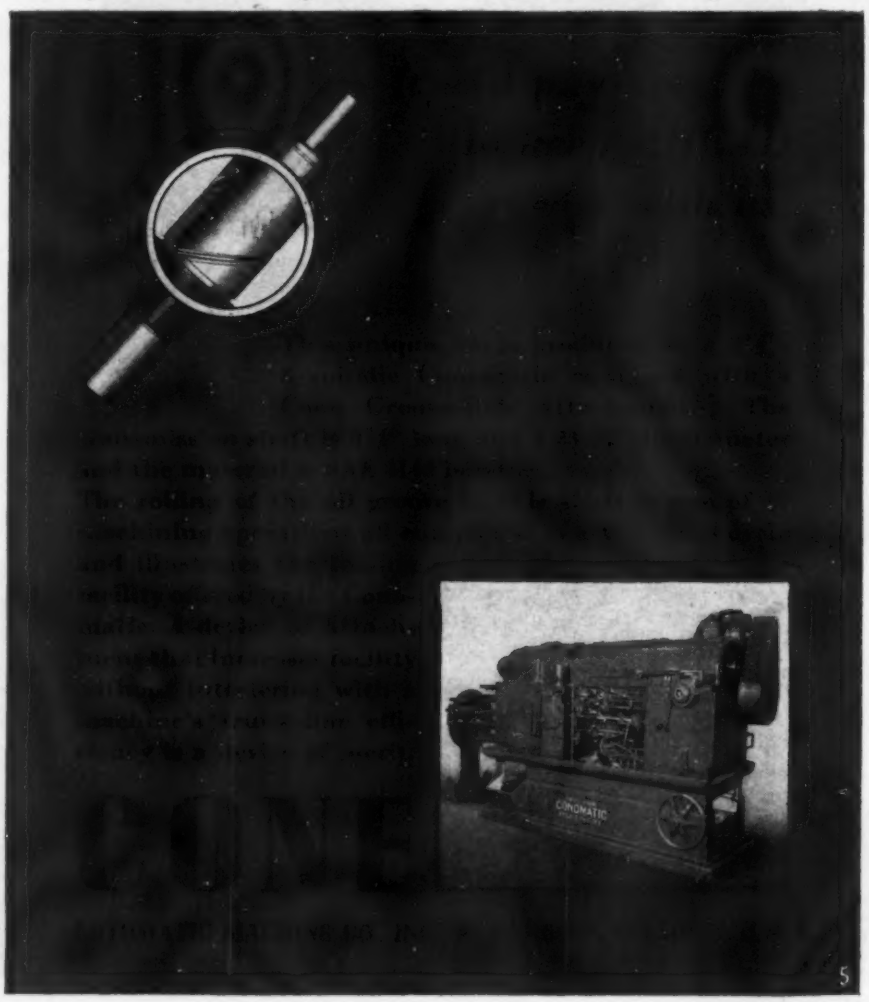
The cost of Diesel-produced electric power is expected to be cut in half as the result of war-time developments.

Street cars designed for post-war production will be lighter, quieter, better looking, and more economical in operation. They will have more comfortable seats and the windows will be higher to give strap hangers a better view.

A new fluorescent lamp, about the size of a marble, uses only two cents worth of current a year.

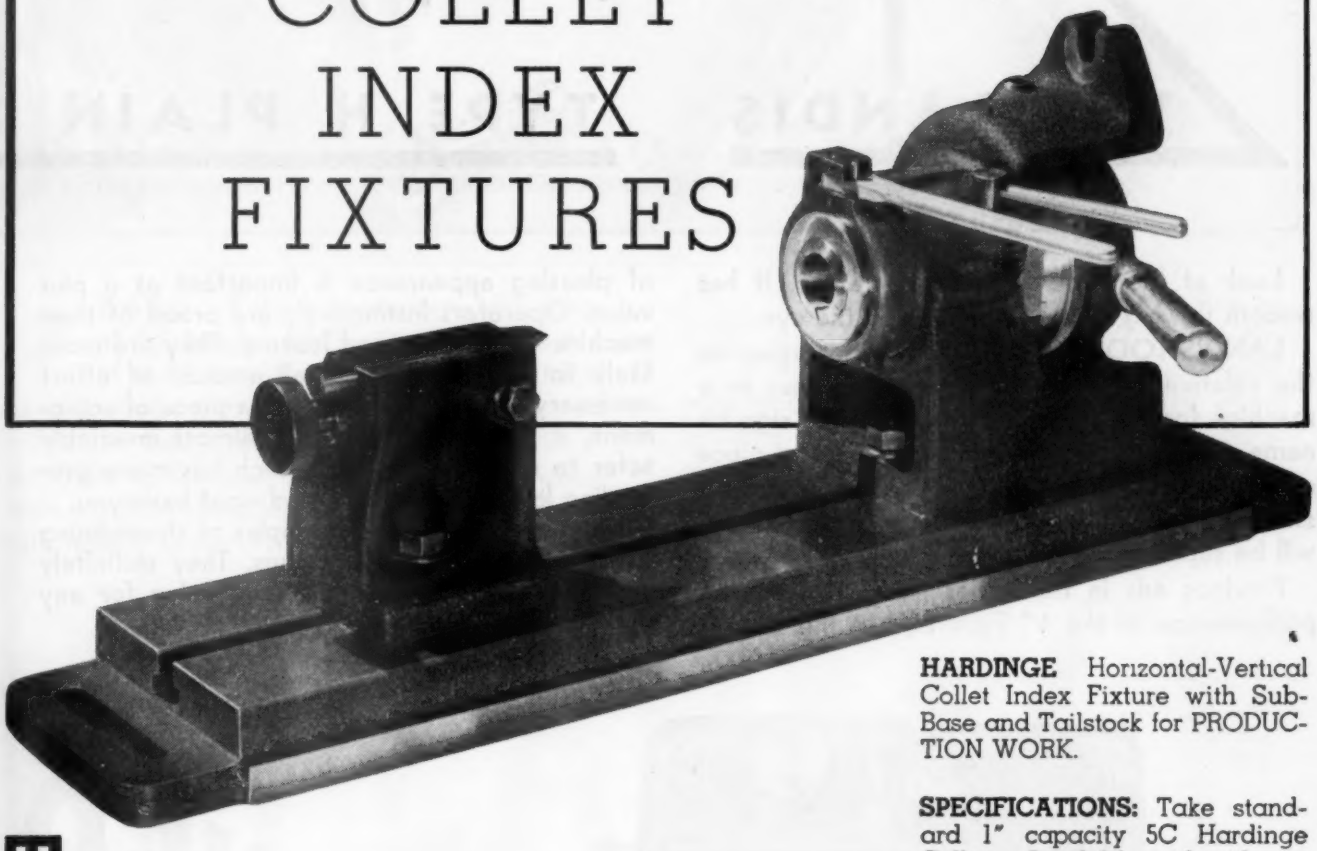
A new electronic method of sorting metals detects differences in material, alloys, heat treatment and thickness.

Success of the "bazooka" against enemy tanks has called public attention again to the rocket or reaction engine as a source of power. Such a motor has been constructed, for experimental use, that develops 260 horsepower for each pound of its weight. One horsepower per pound is the approximate output of the lightest internal combustion engines.



HARDINGE

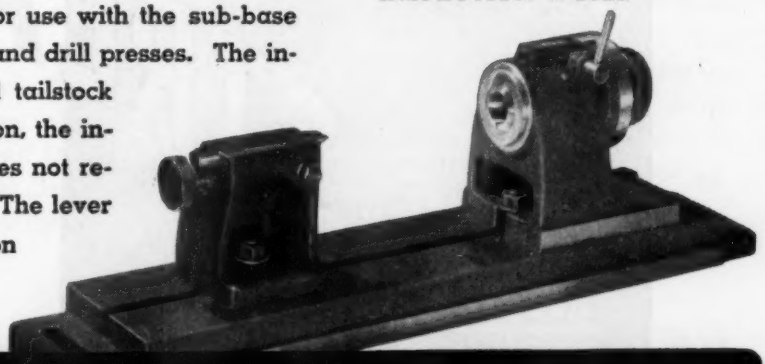
COLLET INDEX FIXTURES



HARDINGE Horizontal-Vertical Collet Index Fixture with Sub-Base and Tailstock for PRODUCTION WORK.

SPECIFICATIONS: Take standard 1" capacity 5C Hardinge Collets. Available with either a 20 or 24 hole hardened and ground index plate. The sub-base is 24½"x5⅛"

HARDINGE Horizontal Collet Index Fixture with Sub-Base and Tailstock for TOOL ROOM and INSPECTION WORK.

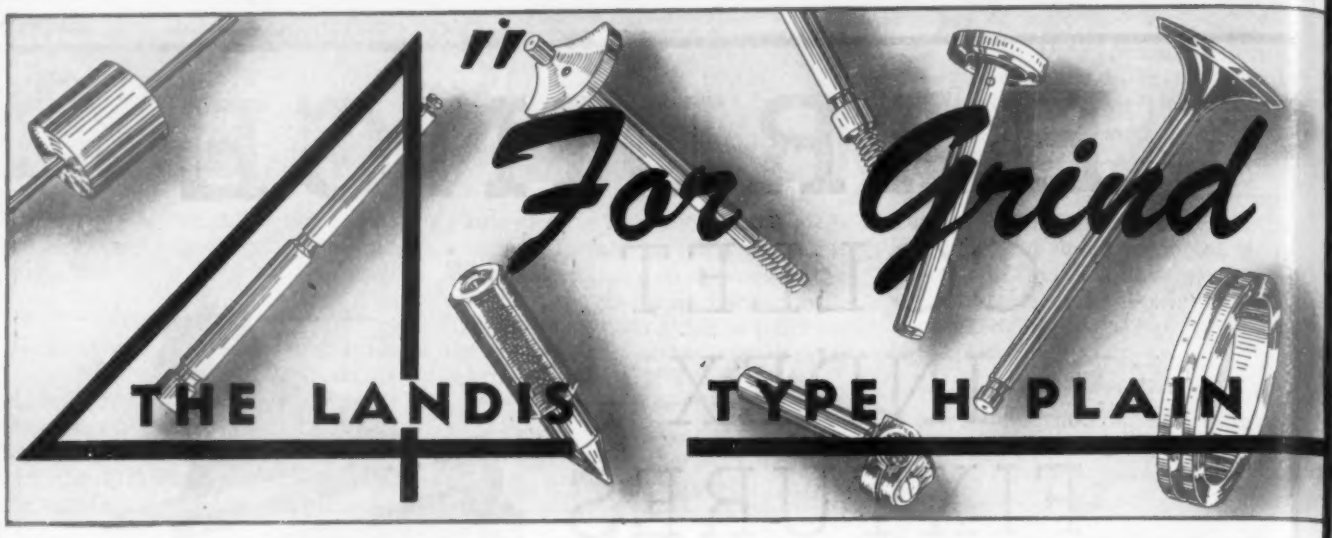


Time and again, you have experienced the need for a fixture to quickly hold work accurately and, at the same time, provide a means for indexing. HARDINGE Collet Index Fixtures fulfill those requirements economically and there is planned interchangeability of the various units for application to a wide variety of work.

These fixtures are for direct application or for use with the sub-base on your milling machines, grinders, shapers and drill presses. The index head shown above with sub-base and tailstock can be used in a horizontal or vertical position, the index plate has preselector screws so that holes not required for a particular job can be "blinded". The lever facilitates chucking of work on a production basis.

Ask for complete bulletin.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



Look at the Type H from any angle. It has smooth flowing lines—is pleasing to the eye.

LANDIS TOOL has no illusions with respect to the relative importance of attractiveness in a machine tool. No sensible purchaser will sign his name on the dotted line just because the piece of equipment he is about to buy has modern streamlining. The basic requirement is and always will be superior performance.

Previous ads in this series have stressed the performance of the 4" Type H, but this matter of pleasing appearance is important as a plus value. Operators instinctively are proud of their machine when it is good looking. They are more likely to put forth the small amount of effort necessary to keep it clean. Such a piece of equipment, if properly designed, is almost invariably safer to operate than one which has many protruding levers, handwheels and what have you.

Consider the specific examples of streamlining described on these two pages. They definitely point to advantages which have value for any prospective purchaser.

431

STREAMLINED

1 The headstock is low and flat on top. Inside the cover is an unusually compact and efficient work drive. The multiple V belts and super-precision ball bearings make its operation as smooth as its appearance.

Unusual Performance as Usual

2 The lines of the bed conform with those of the heads and the guards on the top of the bed. All pumps, drives, electrical control equipment and such items are mounted within the bed and easily accessible. A well in the front of the bed is provided for operation from a sitting position—a feature very popular with female operators.

3 The footstock, too, is low and flat on top. The top of the base is cast in the form of a tray so that it will conveniently hold tools or the work being ground. The wheel dressing device is so cleverly built into the footstock base that its presence can hardly be detected.

APPEARANCE

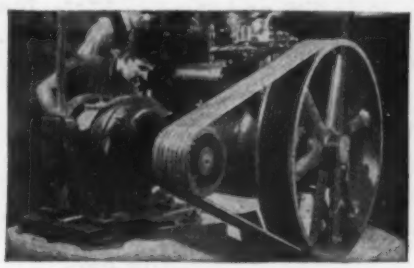
4 The most important factor in connection with the 4" Type H streamlining is that it has been achieved without sacrificing machine performance or efficiency. All mechanisms which may require inspection or readjustment are readily accessible. Neatly grouped at the front are all the controls within easy reach from the normal operating position. Items of extra and special tooling frequently supplied to step up production of certain parts are all designed in keeping with the smoothness and efficiency of the base machine.

5 Like the headstock and footstock, the wheel base is low and flat on top. Raising the cover quickly reveals the fact that the streamlining is functional, as it guards the grinding wheel and the wheel drive belts and protects the wheel drive motor. The handwheel feed is built into the wheel base casting and the handwheel is exactly where the operator can manipulate it naturally and with ease.

LANDIS TOOL COMPANY
WAYNESBORO—PENNSYLVANIA

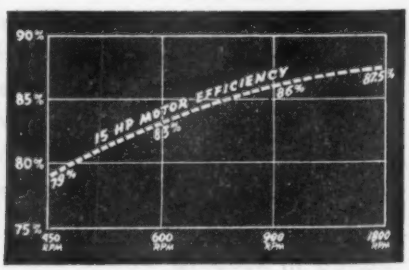
A-C "Team" Flexibility

★ To drive low speed machinery with high speed motors (now that low speed motors are sharply restricted), Allis-Chalmers Texrope Drives can "gear down" motor speeds over a range of 7 to 1. As America's only builder of *both* motors and V-belt drives, Allis-Chalmers has long studied and advocated their use in proper com-



1 In most applications, an 1800 rpm motor with Texrope Drive will ably do the job of a lower-speed, direct-connected motor —at lower cost in money *and materials!*

2 When you buy an 1800 rpm instead of 450 rpm 15 hp squirrel-cage motor, for example, 600 lb are saved. And *you* save well over $200 — with drive figured in!



3 Note that efficiency rises from 79% for the 450 rpm motor to 87.5% for the 1800 rpm motor. The 1800 rpm motor saves you over 30 kw/24 hr. day.

A-C MILWAUKEE — WE WORK FOR VICTORY — WE PLAN FOR PEACE

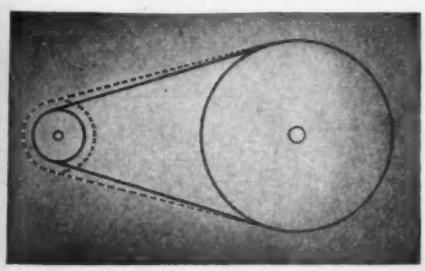
ALLIS-C

Gives You now needed

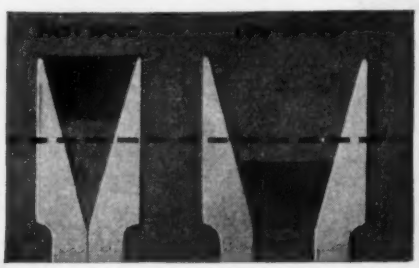
bination . . . today offers you the benefit of long pioneering experience. Texrope Drives are compact, highly efficient, protect your equipment by absorbing shock.

★ To drive a machine at different rates with a single speed motor (now that multi-speed motors are sharply restricted), Texrope Adjustable-Speed Drives give you infinite speed range up to 375%. And in Allis-Chalmers full line of Texrope Drive equipment you'll find the *right* range for your machines . . . thus avoid paying extra for more speed than you need. For engineering cooperation, feel free to call on your nearby Allis-Chalmers district office or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

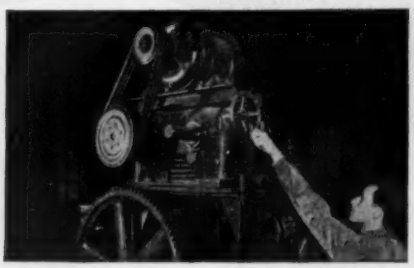
A 1706



4 Infrequently needed speed changes can be had by changing from one size motor sheave to another. Juggling *complete* drives, range is 1:1 to 7:1.



5 With the Allis-Chalmers Vari-Pitch Sheave, you can increase or decrease speed by adjusting sheave diameter . . . obtaining an *unbroken* series of speeds!



6 Allis-Chalmers Vari-Pitch Speed Changer gives you infinite changes at the turn of a wheel — within 3.75 to 1. It's compact, flexible, *efficient!*

ALLIS-CHALMERS

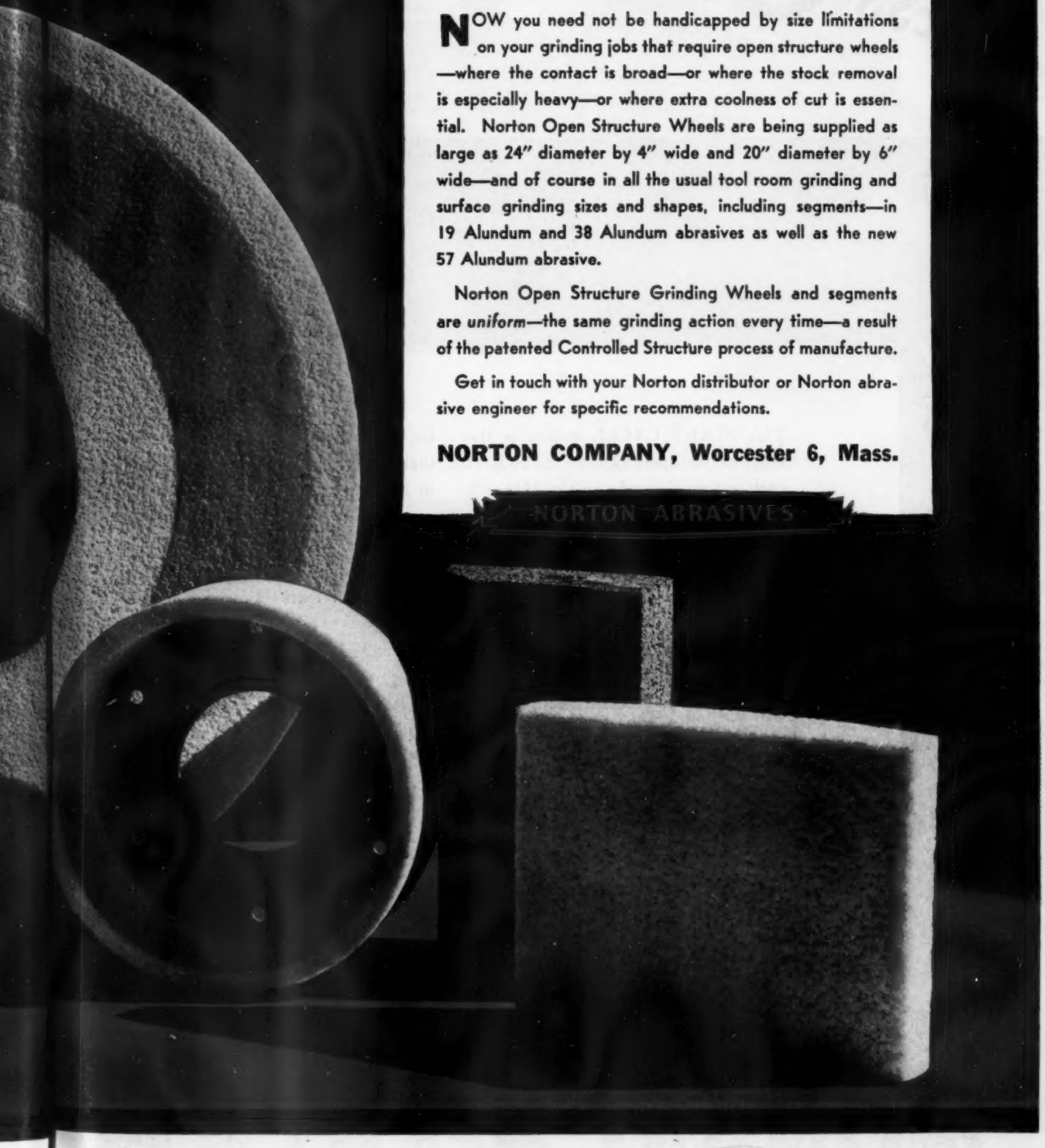
LO-MAINTENANCE MOTORS
TEXROPE DRIVES

YOU CAN GET NORTON OPEN S
As Large A

STEALS WORK FROM PLANER

In an Illinois plant a Norton Open Structure Grinding Wheel 20 x 2 x 12", 3336-112 BE removed stock so fast without burn that it was possible to eliminate a planing operation and do the work directly with this Norton wheel.

STRUCTURE GRINDING WHEELS As 24" in Diameter!



NOW you need not be handicapped by size limitations on your grinding jobs that require open structure wheels —where the contact is broad—or where the stock removal is especially heavy—or where extra coolness of cut is essential. Norton Open Structure Wheels are being supplied as large as 24" diameter by 4" wide and 20" diameter by 6" wide—and of course in all the usual tool room grinding and surface grinding sizes and shapes, including segments—in 19 Alundum and 38 Alundum abrasives as well as the new 57 Alundum abrasive.

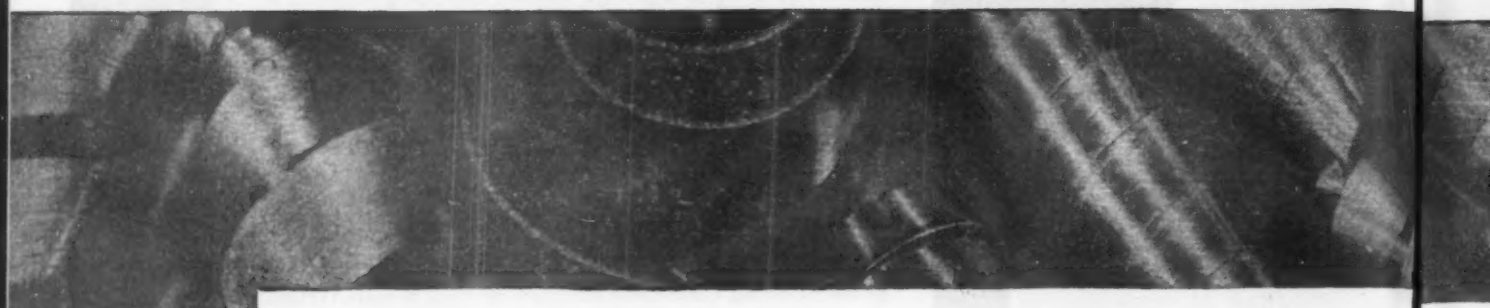
Norton Open Structure Grinding Wheels and segments are *uniform*—the same grinding action every time—a result of the patented Controlled Structure process of manufacture.

Get in touch with your Norton distributor or Norton abrasive engineer for specific recommendations.

NORTON COMPANY, Worcester 6, Mass.

NORTON ABRASIVES

PRESS *One Button* FOR CO



This START CYCLE switch is the only one the operator need use to start each automatic cycle on the Monarch Magnamatic Lathe. On the panel are centered all other electrical controls for set-up and automatic operation. These controls give the Magnamatic the flexibility to make it the most universal automatic lathe ever built.

For many varieties of turning, boring or facing work, Magnamatics have proved amazing time savers. Average set-up time for automatic lathe jobs is from 5 to 15 minutes. This permits a Magnamatic to be used economically on short runs . . . yet on the other hand, its completely automatic operation makes it invaluable for machining parts in large quantities.

Any number of diameters or lengths with intervening tapers or contours are produced automatically and precisely on the Magnamatic. A reasonable number of tools can be held in the rear carriage slide for facing, necking or chamfering work. Single point tools are guided by gage blocks, micrometer heads or solid template, depending upon the work.

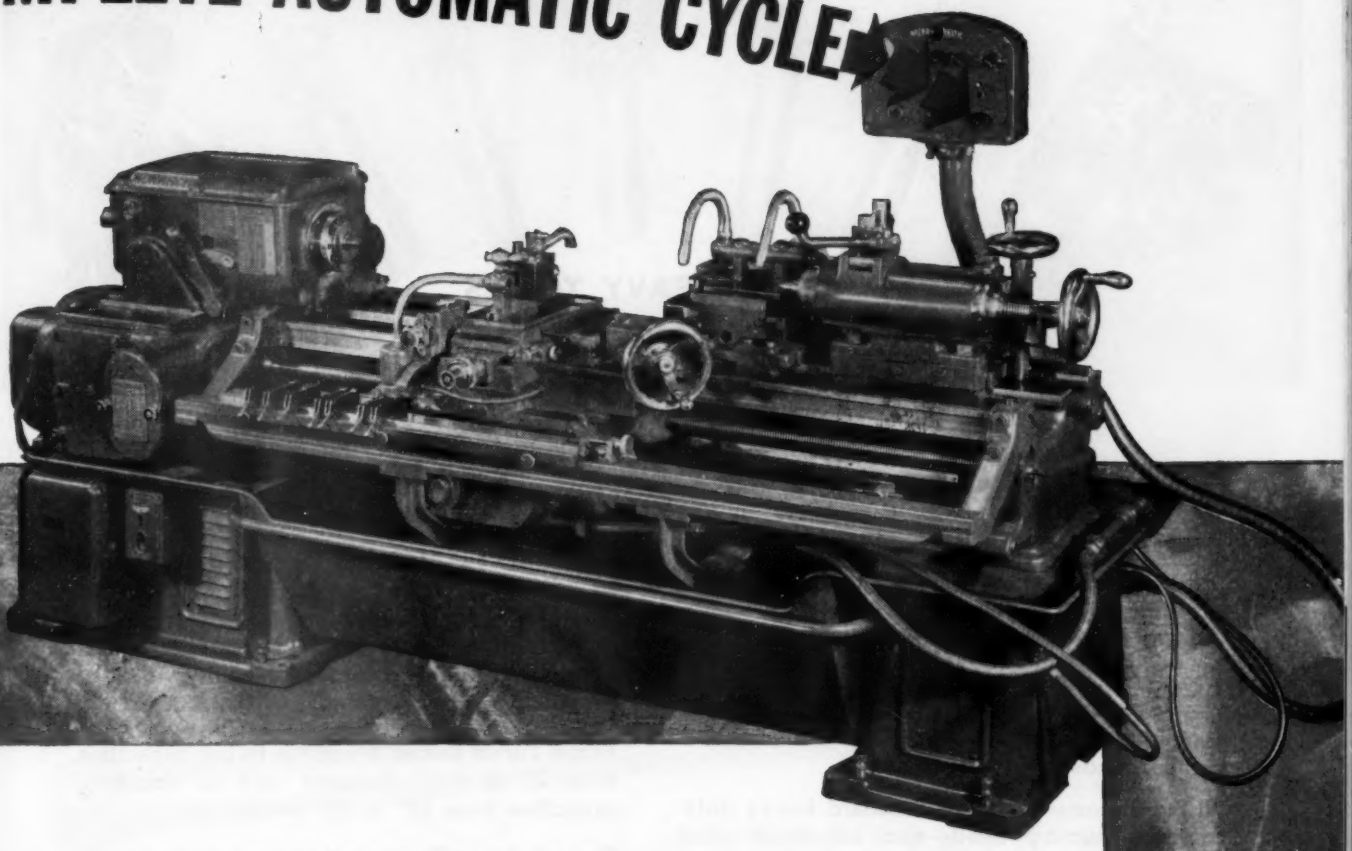
Our engineers will gladly work with you to help you save time and reduce costs with Monarch Magnamatics.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

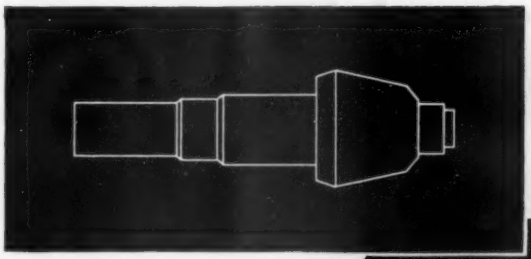
Direct factory branches: 622 West Washington Blvd., Chicago · 10465 Carnegie Ave., Cleveland
801 Fisher Bldg., Detroit · 1060 Broad St., Newark · Liberty Ave. and Stanwix St., Pittsburgh.
Representatives in principal cities.

MONARCH LATHES

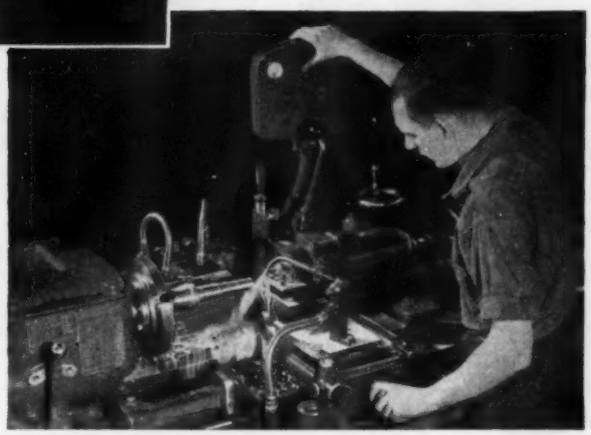
OR COMPLETE AUTOMATIC CYCLE



Example of typical Magnamatic job

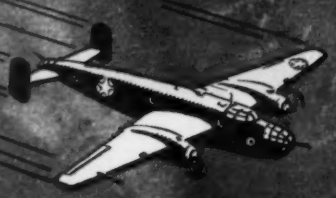


This Monarch Magnamatic is turning a truck bevel-pinion (10¼" long) from a template, with diameters and tapers as indicated. Set-up time with template and rear tools is only 15 minutes. One operator tends two machines, producing 32 pieces per hour. Material is SAE-3150; surface speed, 275′; feed, .017".



Monarch Magnamatics were developed and proved in many plants before the war. Production was interrupted to enable us to deliver standard and toolmaker's lathes for War work. Now, we return Magnamatics to the Monarch line, with reasonably short deliveries. They can be converted to peacetime work quickly without loss of productive time, and with a minimum of tooling cost.

s Save Time



THESE HEAVY TOOLS PROVIDE GREATER RIGIDITY AND INCREASE THE RANGE OF

CINCINNATI ACME TURRET LATHES

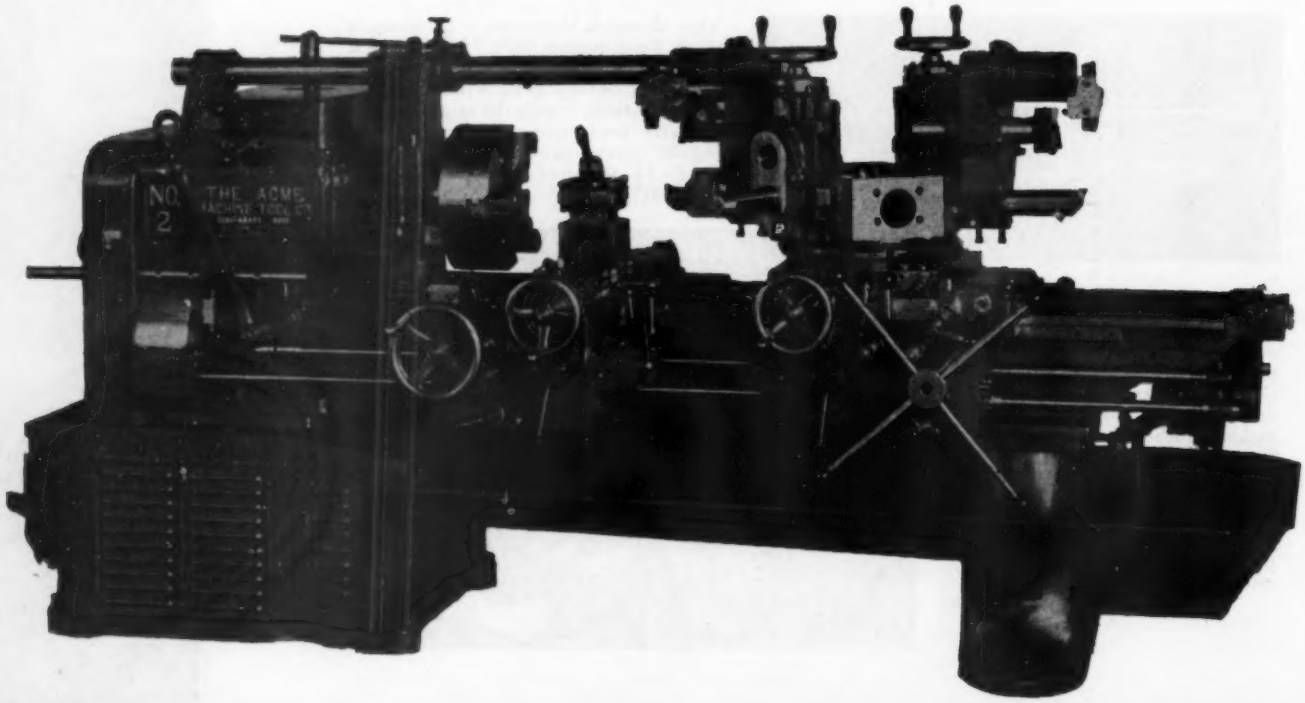
● The group of heavy tool heads and holders illustrated have been developed by Acme Machine Tool Co. to meet the current demands for power—high speed—and accuracy imposed by the increased use of carbide steels. At the left is an adjustable multiple turning head with guide bushing for taking support from the rigid heavy stationary bar mounted on the headstock.

At the extreme right is a standard heavy duty multiple turning head—non adjustable—but with fixed center holes for holding various cutter heads.

Tool holders of straight and angular, types and an adjustable type for the fixed center type head are also included in the center of the group. These are built extremely heavy throughout and accommodate cutting tools of very heavy cross sections.

Acme Turret Lathes are made in bar capacities from 2" to 4½" diameter and in chucking capacities from 20" to 28" swing.

Consult Acme Engineers on your tooling problems.



...The ACME MACHINE TOOL CO.
...CINCINNATI 32, OHIO.

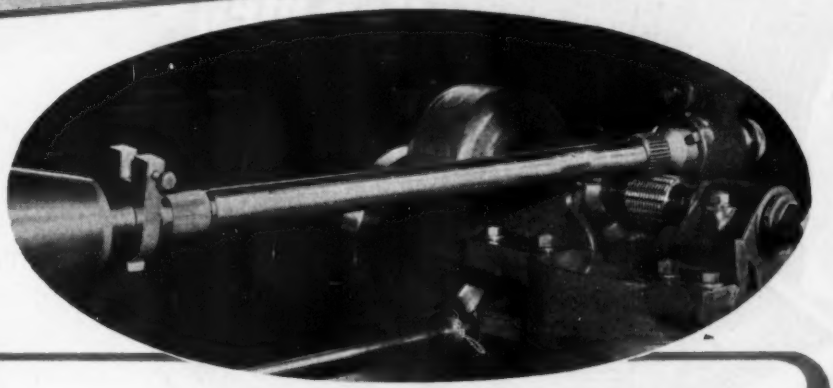
ANOTHER EXAMPLE OF

BARBER-COLMAN

HOBBING MACHINE PERFORMANCE

TYPE "A" LONG BED HOBBING MACHINE

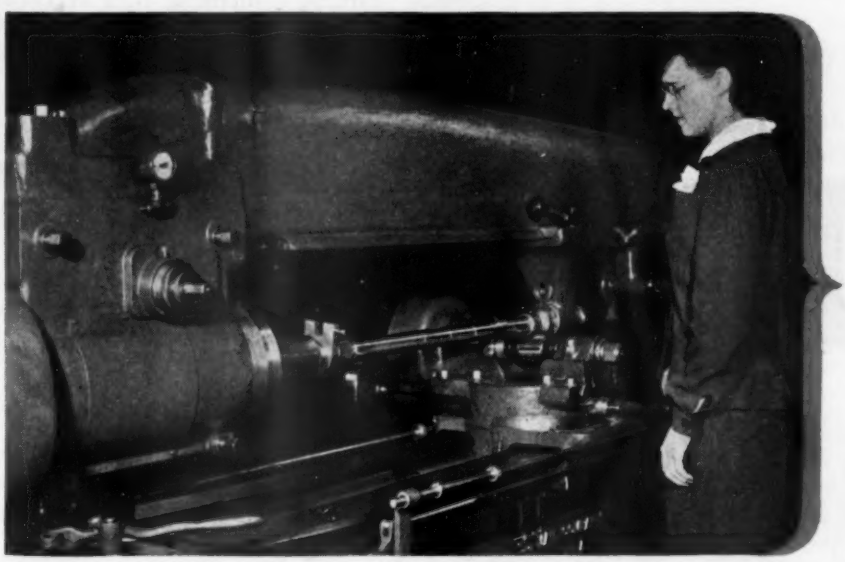
The machine used on this job is a Barber-Colman Type "A" Hobbing Machine with 40" Extra Length Bed, giving a working capacity of approximately 56" length. The Type "A" is a rigidly constructed machine that produces consistently accurate work on jobbing or production operations. For complete specifications, write for Type "A" Bulletins — F-1099 and F-1409.



ACCESSORY DRIVE GEAR . . .

. . . ON THE END OF A LONG, TOUGH SHAFT

This is an accessory drive shaft for a large, powerful radial aircraft engine. The material is AMS 6915 steel, with a hardness of 225-250 Brinell. The involute spline on one end of this shaft is 2.165" outside diameter by 1½" face and has 34 teeth of 16 pitch, 30° pressure angle. The work is held between centers and rotated by a dog driver (not shown) on the taper serrated end. Splines are hobbed concentric with ground shaft diameter within .002" full indicator reading.



70 PER DAY

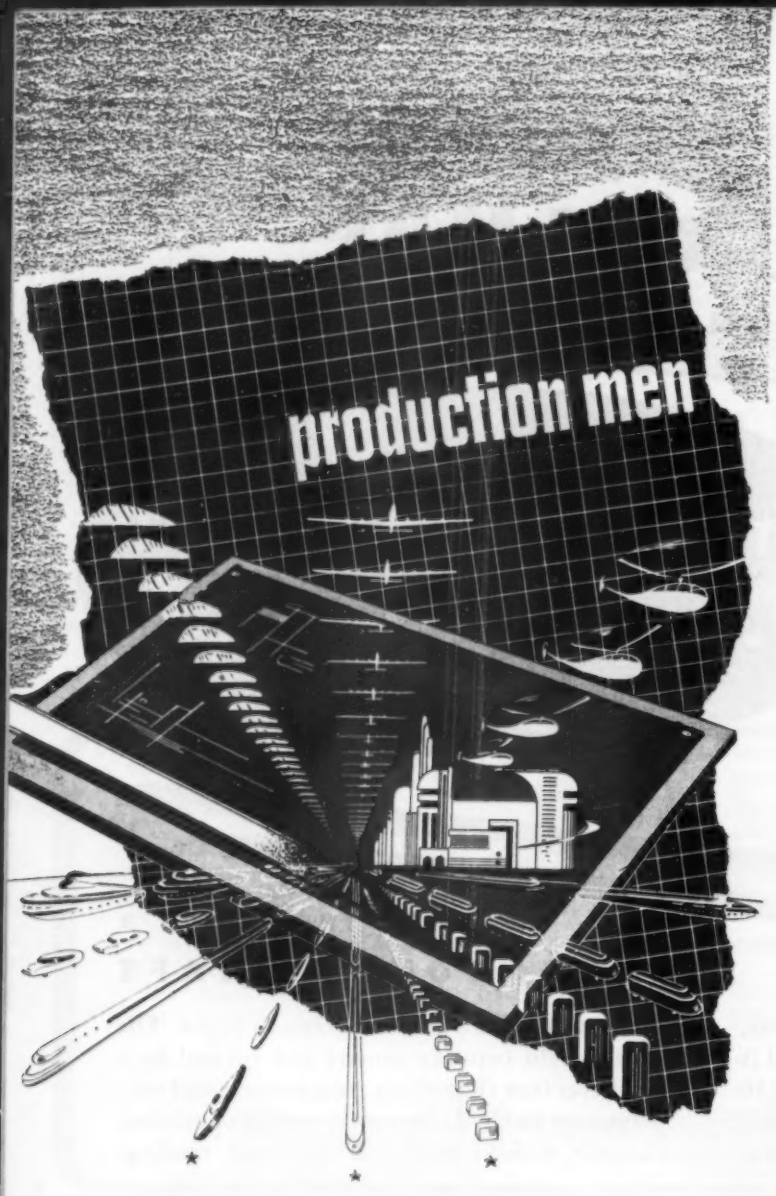
Set-up and hob data on this job are:

Feed per rev. of work..... .0625"
Hob speed..... 70.6 r.p.m.
Production, one operator, two machines .....70 per day
Hob.....2¾" O. D. x 2¾" length, x 1¼" straight hole, ground, single-thread, non-topping.
No. of settings..... 9 to 10
Shift per setting..... .200"
Pieces per setting..... 4
Pieces per grind..... 40

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.



must shape the peace, too

Can you recall when America's war needs in terms of "ships, planes, guns and tanks" were broadcast to the nation? There were those of us then who said it couldn't be done. Impossible! Fantastic!

Comes the peace and there will be those who will say: "It can't be done. We can't provide enough jobs. We can't keep all these wheels turning. The nation's productive capacity far exceeds all conceivable needs for the post war period."

The short-sighted won't see that world markets are but 60 hours — by air — from their shipping room door . . . who think it utopian that much better and much more can be made for far less . . . whose war production at any cost, today, blacks-out the need to blueprint "peacework" product production — and mass selling — at lowest cost, tomorrow.

Better tools will shape the improved products of peace, just as better ordnance will have sped the Victory. Better LeBlond Lathes are available, now. They turn at a profit as they true your product. For your "peacework" turning equipment, turn to LeBlond.

THE R.K. Le BLOND MACHINE TOOL CO., CINCINNATI, 8

NEW YORK 13, 103 Lafayette St. CAnal 6-5281

CHICAGO 6, 20 N. Wacker Dr. STA 5561

time to retool

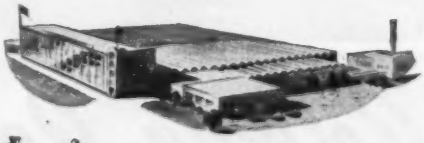
Turn to Le Blond for Turning Equipment

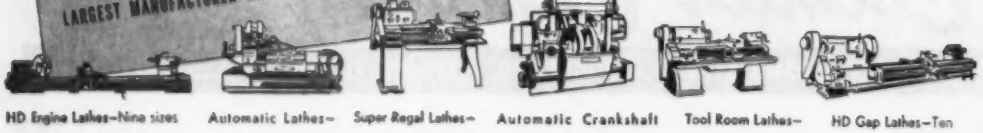
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

ARMY E NAVY

LE BLOND

10 1





HD Engine Lathes—Nine sizes ranging from 12" to 50" swings. For versatility in turning.

Automatic Lathes—12" & 16" Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24" Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face- and angular work.

Check-Clip-Mail

FOR ILLUSTRATED SPECIFICATIONS:

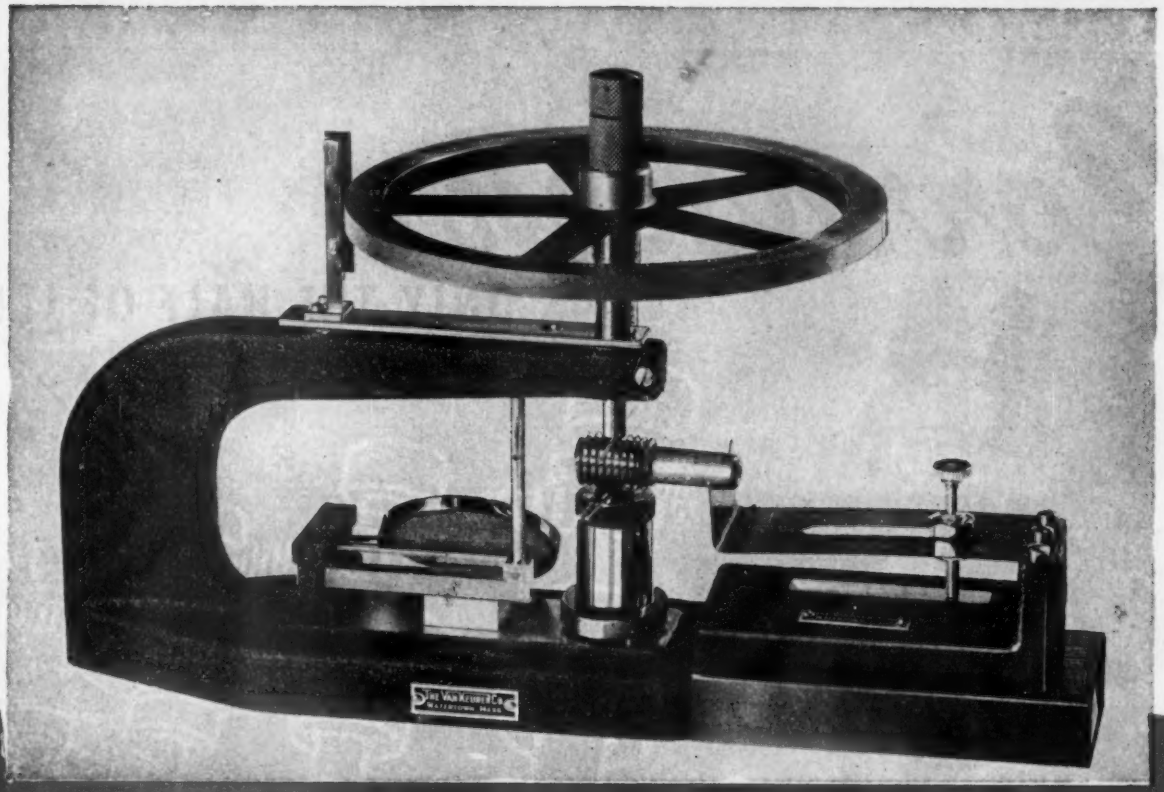
- ☐ HEAVY DUTY GEARED HEAD ENGINE LATHES
- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
- ☐ No. 2 CUTTER GRINDER

YOUR NAME _____ TITLE _____

YOUR FIRM _____ ADDRESS _____

★ YOUR BONDS BUY BOMBS ★

BUY A "BLOCK-BUSTER" TODAY!



Van Keuren LIGHT WAVE MICROMETER FOR SUSTAINED ACCURACY

- **New System of Accuracy**—The VK light wave micrometer is an instrument which has formed the basis for an entirely new method of maintaining high standards of accuracy. No gage blocks are required. Errors from worn gage blocks will not be constantly duplicated in the product.

A calibration chart showing the micrometer screw corrections to .00001" is furnished with each instrument. The new type of hardened and ground precision micrometer screw actually improves with use. Fine workmanship and carboloy wearing surfaces make the instrument accurate and dependable for years of constant service.

- **Controlled Pressure Assures Uniformity** — By using the sensitivity of light waves the VK light wave micrometer insures the exact duplication of measuring pressure by any operator. This controlled pressure feature makes it possible to measure hard or soft materials, and for readings to be duplicated by different operators to .00001".

- **Ideal for Shop Measurements**—The VK light wave micrometer is ideal for making measurements by the 3 wire method, for measuring plug gages, measuring wires, precision parts and shop standards. It is a reference instrument. Forget about comparative measurements with gage blocks—use the VK light wave micrometer. It is fast, accurate and profitable.

The VK light wave micrometer is described in full in our manual of precision measuring equipment. This book also gives complete tables and simplified formulae for measuring all standard threads, splines and spur gears. Write for your copy!

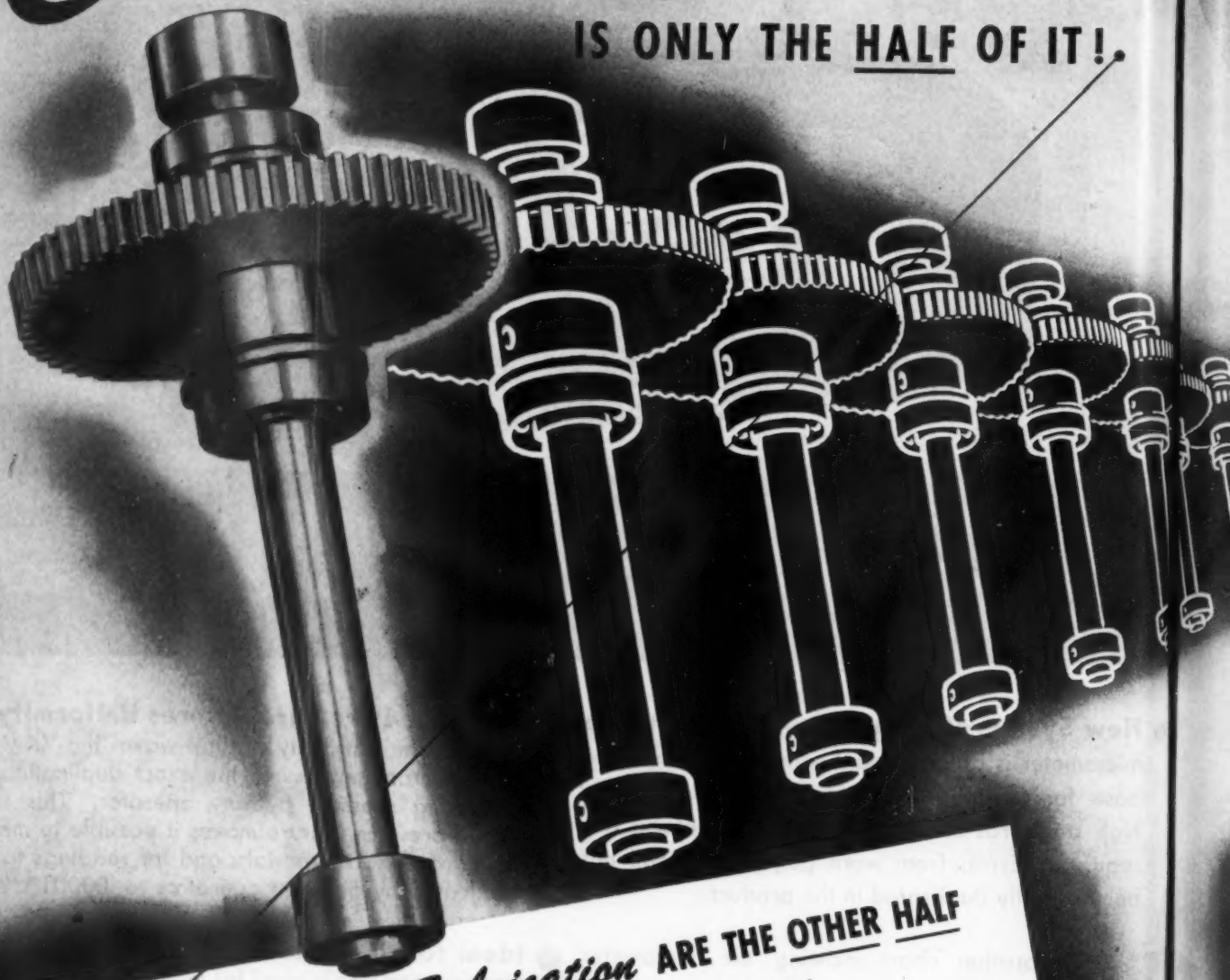
Van Keuren

THE Van Keuren CO., 25th YEAR 176 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles

Corrosion

IS ONLY THE HALF OF IT!



Physicals and Fabrication ARE THE OTHER HALF

Here's what you get with Carpenter Stainless Steels

- √ HIGH STRENGTH/WEIGHT RATIO
- √ RIGIDITY
- √ HEAT RESISTANCE
- √ FATIGUE RESISTANCE
- √ WEAR RESISTANCE
- √ CLEANER BLANKING
- √ EASIER FORMING
- √ FASTER MACHINING
- √ BETTER FINISHES
- √ LOWER UNIT COSTS

more than corrosion resistance

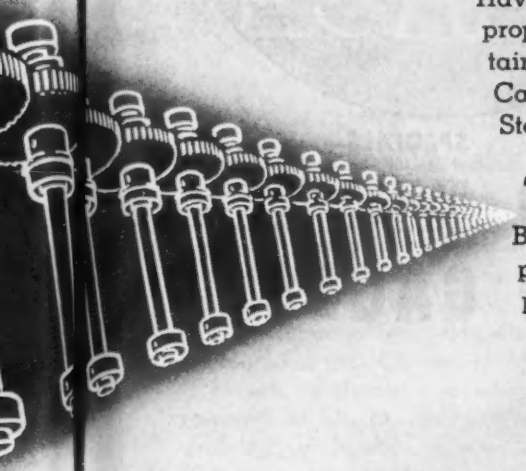
THE CARPENTER STEEL COMPANY, 109 W. BERN ST., READING, PA.

Check all the advantages of Carpenter Stainless Steels

The war has taught all of us how indispensable Stainless Steel is for thousands of vital operating parts that *must* battle corrosion and heat.

And the outstanding performance in this war of modern weight-saving Carpenter Stainless is dramatic proof of this metal's exceptional physical properties. Engineers have discovered new design possibilities in its high tensile strength. They have become familiar with special properties available with certain grades of Carpenter Stainless—positive corrosion resistance—extra hardness—scale resistance—high strength/weight ratio, etc.

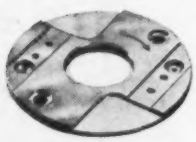
Have you a Stainless job that calls for a special combination of properties? Is the Stainless you are using inadequate to meet certain exacting requirements and conditions? Talk it over with your Carpenter representative. He is trained to help you select the right Stainless Steel, and to solve your fabricating problems.



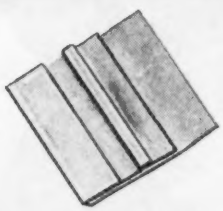
Mass Production OF STAINLESS PARTS...

Before Carpenter invented *Free-Machining* Stainless Steels, and pioneered soft and ductile Stainless Strip, mass production of Stainless parts was costly, difficult and often impossible. Today engineers specify Carpenter Stainless, confident that production will not be hampered by machining or fabricating difficulties. Production men know from war experience that they can meet high output schedules, and do it economically, because of the easier working properties and high uniformity of these Stainless Steels.

Are you enjoying the production economies of Free-Machining Stainless or soft and ductile Stainless Strip in your present operations? Have you checked the possibility of using these Stainless Steels for post-war planning jobs? It will pay you to investigate them!



Need a non-magnetic Stainless Strip that can be easily milled and drilled? This precision part was economically mass produced from Free-Machining Stainless.



Forming can be done more *easily* and more *accurately* with uniform Carpenter Stainless Strip. And it will help you reduce costs on today's and tomorrow's jobs.

With free action of these valve parts a "must" for long, continuous service, Free-Machining Stainless was an obvious choice. And fabrication was simplified.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

STANDARDS—METRO Standard Tools are tipped with general purpose grades for universal shop use for a majority of turning, facing, boring, and forming operations. Immediate delivery from stock.

National Coarse, Fine, and Special made to AGD Standards. Standard Thread, Plug, and Ring Gages shipped immediately from stock.

METRO
PRECISION TOOLS AND GAGES

SPECIALS—Precision Gages of special type and size made to your specifications. Special carbide-tipped tools made to your prints. Let our engineers help you in solving those tough gage or machining problems.

Catalog No. 102

Be sure you have a copy of Catalog No. 102 — complete data on all METRO Precision Tools and Gages.

METRO TOOL AND GAGE CO.

4240 PETERSON AVE.
CHICAGO, 30, ILL.

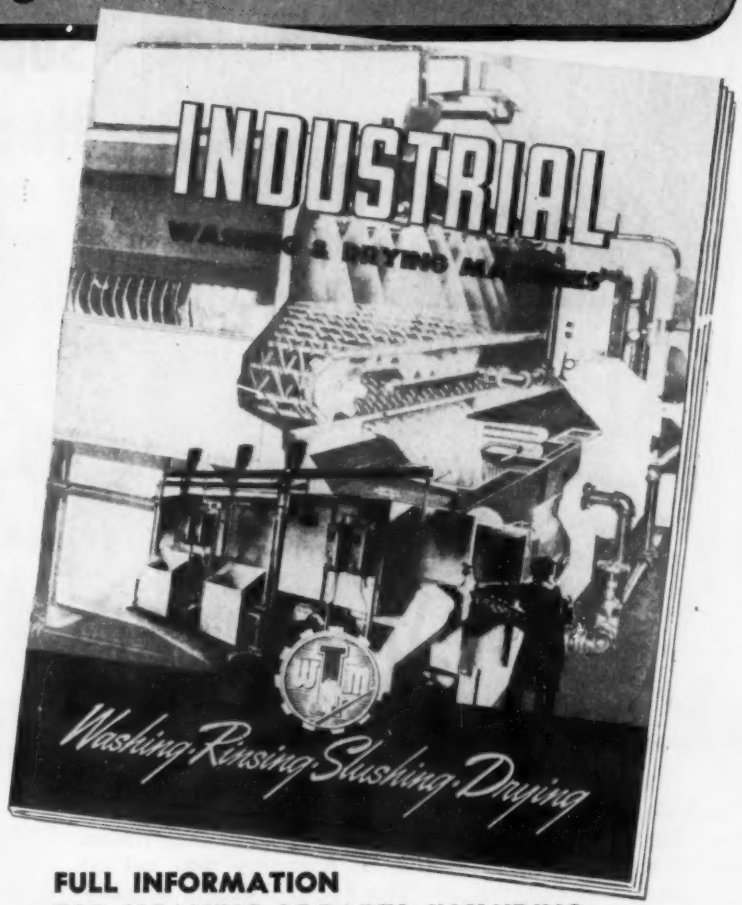
Just off the Press!

THIS NEW BOOKLET

. . . telling how to speed up industrial washing, rinsing, slushing and drying

This new booklet contains valuable, useful information on modern methods for fast, efficient and economical washing, cleansing and drying of a great diversity of parts. It covers, in detail, such subjects as removal of oil, grease, lapping and drawing compounds so that inspection and assembly can be speeded up, various types of equipment, simplicity of operation, and the effectiveness of the process.

Sent FREE on request, this volume is *not* a "selling" brochure. Practical, concise, factual data is made available to engineers, superintendents, foremen, manufacturers and maintenance men for reference and informative purposes. The coupon below may help materially in solving parts-cleaning problems.



FULL INFORMATION FOR CLEANING OF PARTS, INCLUDING:

Airplane engine cylinders	Valves	Nuts and Bolts
Airplane engine pistons	Crank cases	Plated work
Airplane engine gears	Diesel engines	Hand Tools
Ball bearings	Nose sections	Shears
Rods, Baffles	Radio tubes	Gas Meters
Piston Rings	Tote pans	Food Containers
Valve springs	Superchargers	Baking pans, etc., etc.

INDUSTRIAL WASHING MACHINE CORP.

NEW BRUNSWICK, NEW JERSEY

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Industrial Washing Machine Corp.
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Kindly send me your NEW illustrated booklet on Industrial Washing. It is understood this request incurs no obligation on my part.

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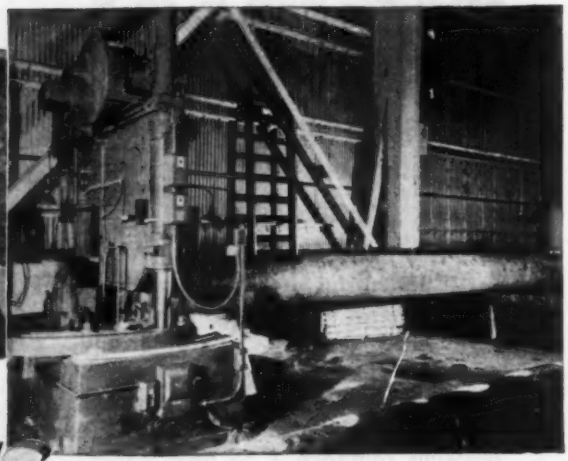
The MARVEL of the Year —the new

MARVEL No. 24

Super-Giant Hydraulic Hack Saw

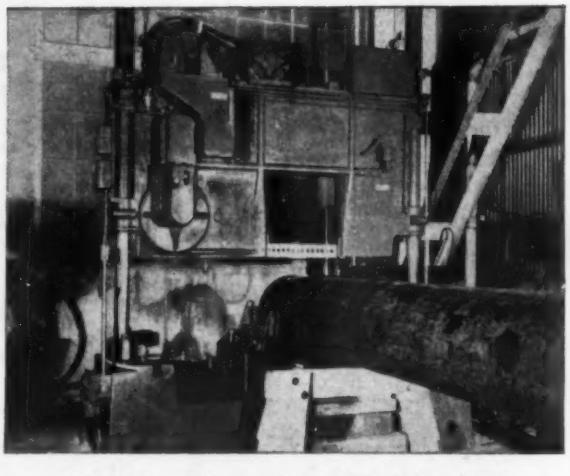
—Capacity 24" x 24"



How big is this machine? Judge from the man in the photo. Its weight, 16,000 pounds—8 tons! Twice the weight of the No. 18 MARVEL heretofore the world's largest hack saw!

The Hack Saw has grown up again! And now you can cut off large billets, forgings, die blocks, etc., up to 24 inch round or square, with the same degree of economy you cut off smaller size work. Yes, the new No. 24 MARVEL is actually a "hack saw," in spite of its mammoth size, since it employs a reciprocating blade. Of course, it uses a much larger hack saw blade than any heretofore available (36" long, 4½" wide, ⅛" thick); but it's still an "inexpensive hack saw blade" compared to the cost of large capacity circular cold saw blades. And, because this hack saw blade is comparatively inexpensive, users of the new giant No. 24 MARVEL machine will not hesitate or worry over cutting off the modern tough alloys in big sizes—a problem that has caused so many headaches where only circular cold saws were available for such large work.

The photos shown were taken at the Mesta Machine Co., Homestead, Pa.—one of the finest-equipped and most modern "heavy" machine shops in the world. The machine is shown cutting off a gigantic 24" round forging. Mesta now has three identical No. 24 MARVEL machines which are doing a fine cutting-off job on all sorts of large size alloys, faster and cheaper, without "fuss," or the nerve-racking howling and groaning of their previous circular saw methods.



This giant saw bears no resemblance to any "small size" hack saw; it follows the modern, basic exclusively "big saw" design of the No. 18 MARVEL.

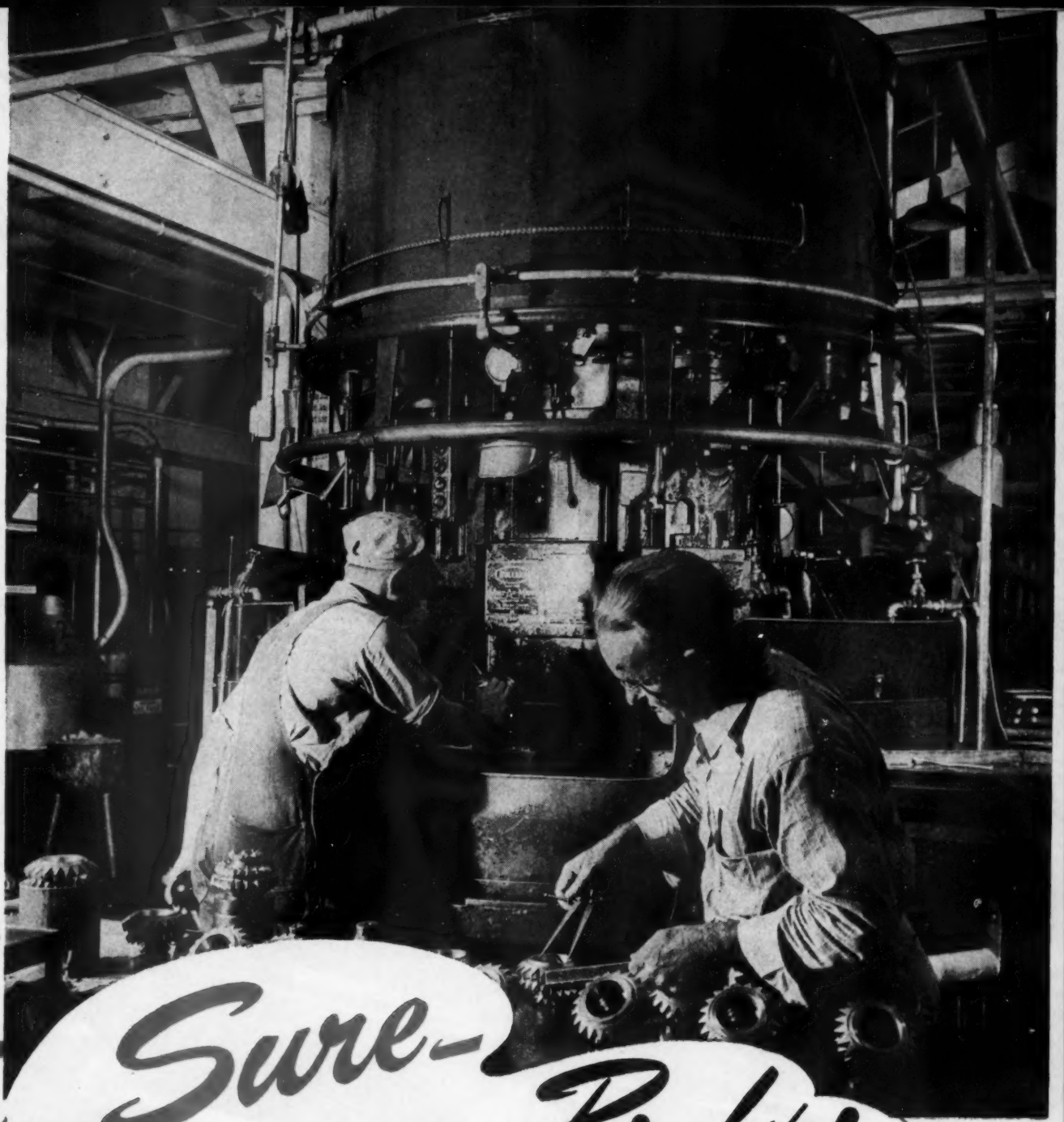
Write for Catalog showing complete line of MARVEL Saws

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. **CHICAGO 39, U.S.A.**

Eastern Sales Office: **225 LAFAYETTE ST., NEW YORK 12, N. Y.**



Sure— THOSE GEARS ARE Right!

Bullard Type "D" Mult-Au-Matic machining Alloy Steel Gears in the plant of a large Southwestern manufacturer.

They're Alloy Steel — and the Mult-Au-Matic Machines Them 30 to 40 an Hour

It takes plenty of gears to turn the many wheels of America's all-out war effort. And they have to be precision made to do their job.

Producing those gears . . . faster . . . at lower cost . . . with dependable accuracy . . . is just one of the many tasks for which industry is using the Bullard Mult-Au-Matic. For with the Mult-Au-Matic 6 stations—or 8—work simultaneously; hence, one operator with one machine, does the work which by other methods require several.

Quickly adaptable, the many Mult-Au-Matics now engaged on war production will be ready to lower the cost of many new products after the war is won. Although some of the work will be different, Mult-Au-Matic precision will be, as now, inherently and completely *right*.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT, U.S.A.

Guns by the Thousands!!

and Row upon Row of "AMERICAN" PACEMAKER LATHES

...producing them in the Plant of THE DOMINION ENGINEERING CO.

Our fighting forces need guns and more guns and they are getting them in ever increasing numbers.

In the gun plants of this country and Canada "AMERICAN" Lathes are meeting every challenge of increased schedules. They are producing as they never produced before and at the same time are maintaining amazing standards of accuracy.

For all-out production, call on "AMERICAN".

THE AMERICAN TOOL WORKS COMPANY

Lathes - Radials - Shapers

CINCINNATI, OHIO, U. S. A.

RECENT expansion of our manufacturing facilities has enabled us to increase our production of Thread Ring Gages to such an extent that we are now in a position to supply practically all standard sizes directly from stock.

When an emergency arises and you discover a sudden need for certain sizes, wire your order to Cadillac and your requirements will be speedily met. In fact, unless our stocks of a particular size have been temporarily depleted by similar rush orders from others, shipment will be made the very day your order is received.

The same applies to Standard Thread Plug Gages. With thousands on hand, ready to be packed and shipped, we can have them on their way to you immediately—by air express from the nearby Detroit airport, if so requested.

CADILLAC
Thread Ring
GAGES

ALL STANDARD SIZES

NATIONAL FINE
NATIONAL COARSE
0-80 to 1½-6
also
PIPE PLUG GAGES
⅛ to 1¼

CADILLAC THREAD GAGES CADILLAC

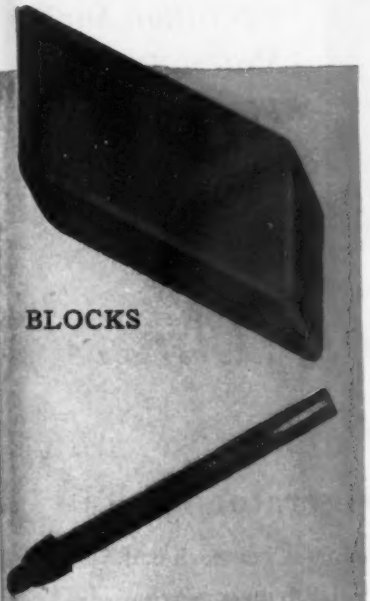
CADILLAC GAGE COMPANY, Detroit 5

THE MATERIAL — SYNTHETIC RUBBER

THE MEDIUM — Brightboy

FOR CLOSE-TOLERANCE

DE-BURRING • FINISHING POLISHING



BLOCKS

STICKS and RODS

SPECIAL SHAPES

Rubber gives RESILIENCY—relative softness that controls and "cushions".

Rubber-cushioned Brightboy applies this resiliency. Brightboy *combines* rubber and abrasive, which work together to save countless operations in de-burring, finishing, polishing.

Made in wheels and rods for machine use; in blocks of various sizes for manual work. No special preparation required. Ask your dealer for prices and Applications Data. Ask Brightboy field representatives or our Service Department about saving time, improving quality, in your abrasive finishing.

BRIGHTBOY INDUSTRIAL DIVISION

WELDON ROBERTS RUBBER CO. **Newark 7, N. J.**

WHEELS

WELDON ROBERTS

Brightboy

REG. U.S. PAT. OFF.

"The Soft Rubber Binder Cushions The Abrasive"

The advantages of BLANCHARD *grinding*

Production
Adaptability
Fixture Saving
Operation Saving
Material Saving
★Fine Finish
★Close Limits
★Flatness

Actual Size of Blade

★Fine Finish ★Close Limits ★Flatness

Grinding Hardened Steel Refrigerator Blades

These refrigerator blades are ground square to .0001″ on each end.

For the first operation the blades, held in special fixtures, rest on supporting plates. After grinding one end, the fixtures are turned over with the ground end of the blades resting directly on the magnetic chuck, thus insuring greater accuracy. The photograph shows them ready for this second operation.

Sixty blades are on the chuck at one time, .006″ of stock is removed from each end and production is at the rate of 200 pieces (400 surfaces) per hour.

The *"Put it on the Blanchard"*

BLANCHARD MACHINE COMPANY

64 State St., Cambridge 39, Mass.

This job being done on the No. 18 Blanchard Surface Grinder

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

A die-cast part like this

adds lightness to lightness

Thin walls, possible in Mazlo Magnesium die castings, permit weight saving on a mass production basis unequaled by any other process. Because the molten metal is forced into dies under high pressure, wall thicknesses can be much thinner than those cast in sand or permanent molds.

Note the fineness of detail in that Mazlo Magnesium die casting. With but little machining, it is ready for the assembly line. And even that work goes fast, for magnesium machines smoothly and accurately at high speeds. The combination of thin sections, low fabricating and machining costs frequently places magnesium die castings on a competitive basis with the heavier metals.

Among the magnesium products going into our fighting planes are many die castings made by American Magnesium Corporation. Their extreme lightness, compactness and dependability are contributing to the advancement of aircraft design. They will do the same for you.

Our engineers will assist you in adapting magnesium die castings to your wartime or postwar products. Aluminum Company of America, Sales Agent for Mazlo Magnesium Products, 1709 Gulf Bldg., Pittsburgh 19, Pa.

MAGNESIUM MAZLO PRODUCTS

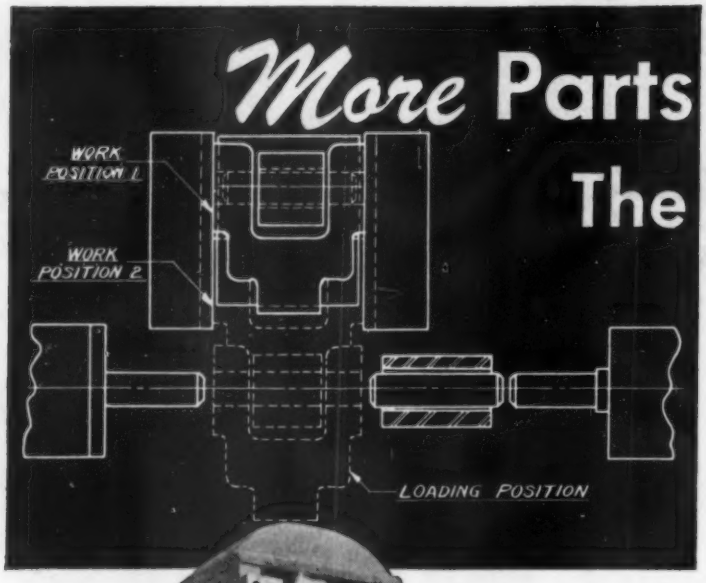
REG. U.S. PAT. OFF.

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

More Parts Per Broach The *American* Way—

PROVEN in war... Ready for PEACE



Drawing illustrates sliding work table with two selective work positions. During the machine cycle the part is hydraulically located, locked in position, broached and returned to loading position where the locating pin is removed.

Precision work at a mass production rate—*plus* the extra economy of doubled output per broach sharpening!

This is a typical example of the application of *American's* complete broaching service to a production problem. American Broach & Machine Company engineers set up this operation to finish the sides of universal joint yokes.

An American SB-42-10 surface broaching machine is used, equipped with a special receding table incorporating two selective work positions. Extra wide broaches, more than twice the part width, make possible the use of one half of the broaching surface at a time. When this half becomes dull the position may be changed so that the remaining half continues the operation. Twice the number of parts per broach sharpening are obtained, reducing production cost and time, maintaining exceptional finish and accuracy!

Avoid stopping any broaching tool during cutting stroke. Excess shock of restarting may cause serious injury.

American
BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

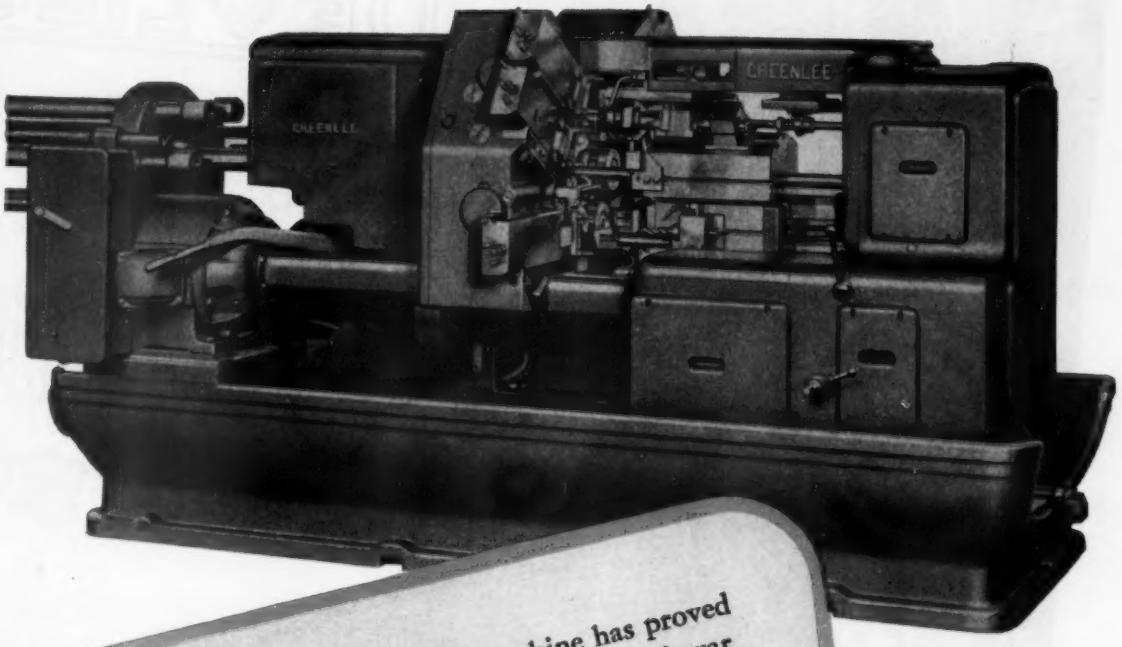
•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF

SIX POINTS OF PRECISION-

AND ALL TIMKEN BEARING EQUIPPED



Manufactured by Greenlee Bros. & Company, Rockford, Illinois.

The Greenlee 6-Spindle Automatic Screw Machine has proved to be one of the most useful and prolific producers of war equipment parts.

With all 6 spindles mounted on Timken Tapered Roller Bearings it possesses the precision, speed and endurance necessary for the production of a large and continuous output of high quality pieces.

Spindle speeds range from a low of 105 to a high of 2850. Feed range per spindle revolution, .0014 to .039.

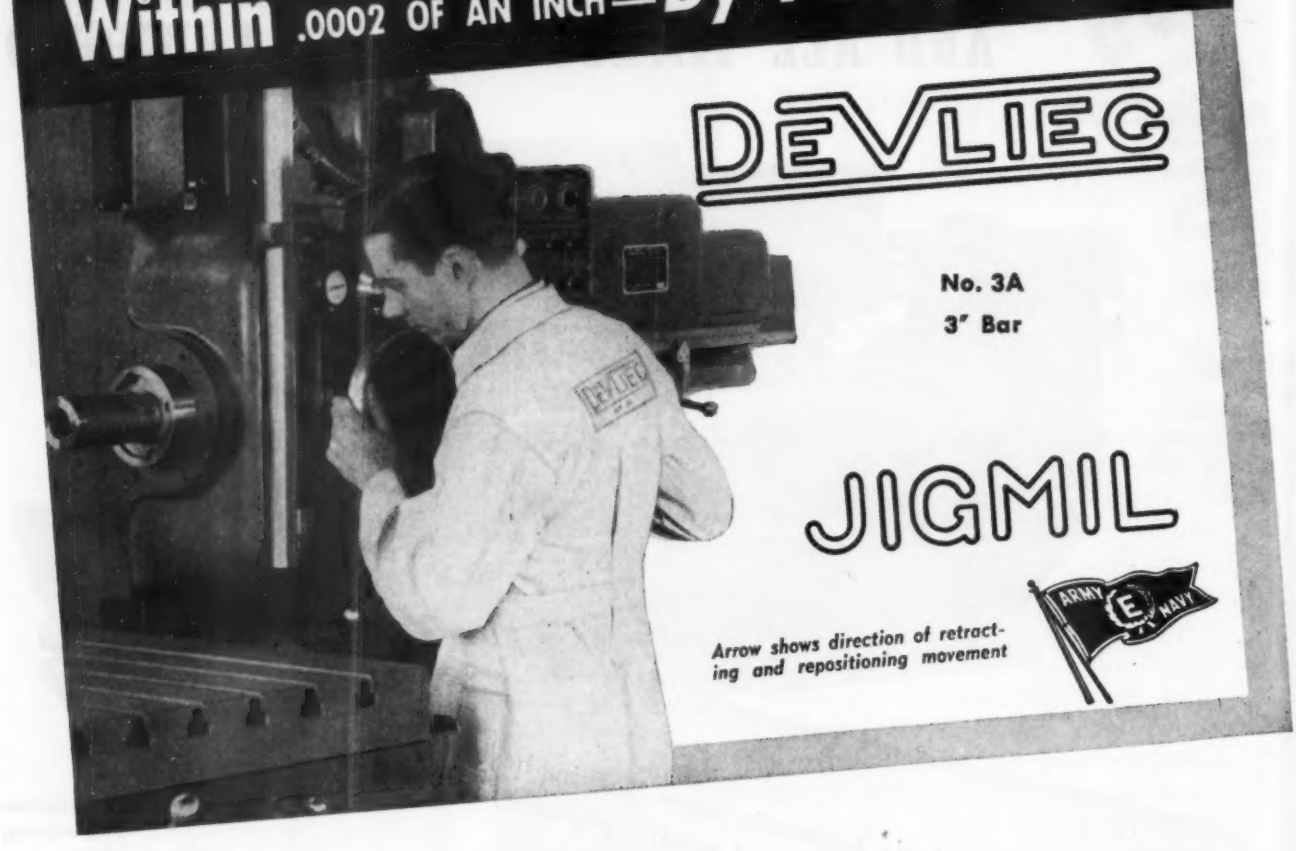
No heavy-duty machine — be it a lathe, milling machine, grinder or any other type of spindle-operated equipment — can be considered really modern unless the spindle is equipped with Timken Bearings; that's why the vast majority of them are. Machine manufacturers and users know it pays. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

Retracting and Repositioning Work Within .0002 OF AN INCH—By Push Button



The most frequently needed function in a precision boring machine is that of retracting the work to facilitate measuring and tool setting.

In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

The DeVlieg Jigmil is a new type machine—has the spacing accuracy of a Jig Borer—Performance Qualities of a Milling Machine—Convenience and Flexibility of a Horizontal Boring Mill. All control is so centered and organized that the operator never has to take his eyes off the work.

Thus, the Jigmil fulfills the machine tool ideal—a powerful and accurate extension of the operator's hand.

Many machines show 75 per cent greater average daily productivity.

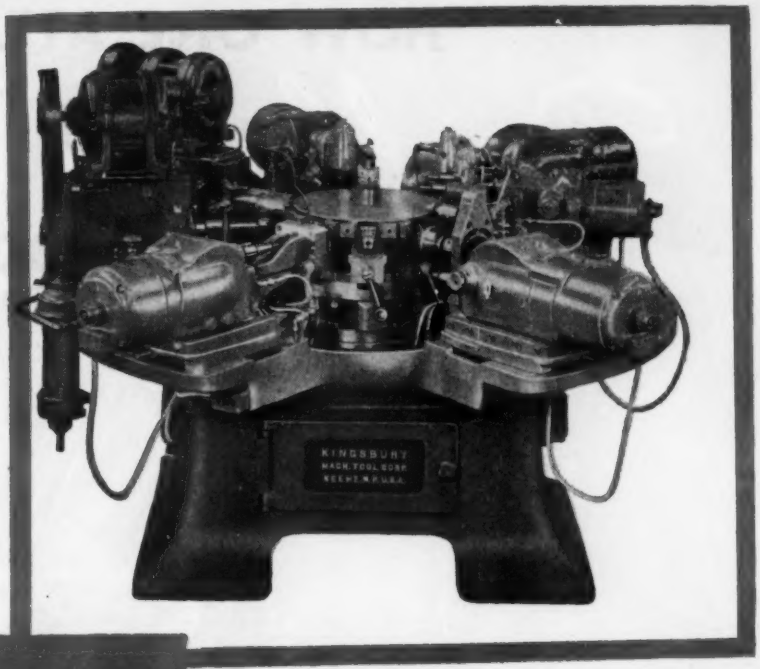
DEVLIEG MACHINE COMPANY

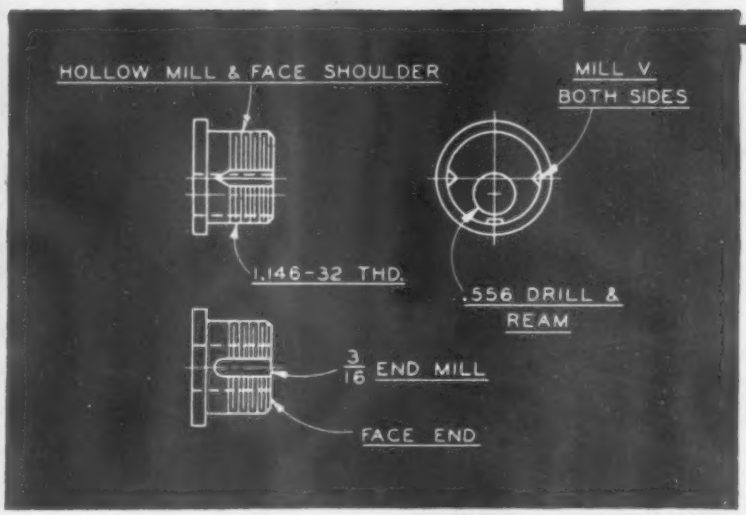
450 FAIR AVE. FERNDALE 20, (DETROIT) MICHIGAN

Write for Circular

DEVLIEG MACHINE TOOLS

Ability to handle widely different operations at top speed proves the value of versatility





THIS IS A FLEXIMATIC SPEED UP JOB

FLEXIMATIC

by KINGSBURY

KINGSBURY versatility is well exemplified in the widely different machining operations performed on bronze lock cylinders. For example, note that hollow milling, facing, V-milling, drilling, reaming, end milling and end facing are included in this set-up on a Model GD FLEXIMATIC. By being able to handle all these operations with a *single chucking of the work,* production is stepped up tremendously.

Whether it's a lock part or a complicated piece involved in ordnance production, the **FLEXIMATIC** can be depended on to meet exacting requirements. Its versatility is practically unlimited because of the basic nature of the method utilized in building up standard units around an indexing turret, each unit designed for handling a specific operation. Not only does this method provide for a wide variety of operations simultaneously but also makes change-over readily possible to meet the requirements of other jobs which call for still different machining combinations.

Whatever the set-up, high production and utmost precision are assured by **FLEXIMATICS.**

KINGSBURY MACHINE TOOL CORPORATION
KEENE NEW HAMPSHIRE U S A

HOW ONE ATTACHMENT *Doubled the Capacity* OF THIS BORING MILL

G. & L. Continuous Feed Facing Head Cuts Machining Time from 60 to 30 Hours

A Giddings and Lewis Continuous Feed Facing and Boring Head, used with a G. & L. Table Type Horizontal, cut the rough and finish boring and milling of a bearing retainer for a locomotive axle housing to 30 hours—30 hours less than the previous time on the same machine without this attachment.

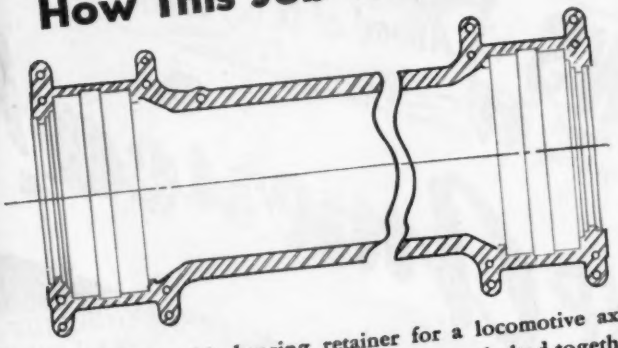
This G. & L. machine is saving set-up and machining time on a wide range of production and maintenance jobs in this railroad shop. On routine maintenance work, such as reboring main connecting rods to compensate for wear, setups can be made in eight to ten minutes and boring completed in five minutes. Savings of 50% in floor-to-floor time are common on all types of boring and milling jobs.

GIDDINGS & LEWIS
138 DOTY STREET

Right: G. & L. Floor Type Machine.

These Five Features Help You Do More Jobs With Your G. & L. . . .

How This Job Was Done



In machining this bearing retainer for a locomotive axle housing, the two halves of the housing were bolted together and mounted on a locating fixture on the machine table. The work was strapped down by bolts through the bolt holes of the split half.

All roughing and finishing operations on one end of the part are completed first, then the part is reversed and the same operations repeated on the opposite end. Speeds of 10 r.p.m. and feeds of ¼" are used on both roughing and finishing. Standard ½" tool bits ground with ⅛" and ⅜" radii are used to machine this part.

This bearing retainer was originally machined in 60 hours floor-to-floor, on the same G. & L. Horizontal without the facing head. The use of the G. & L. Continuous Feed Facing and Boring Head enabled the operator to save 30 hours machining time and obtain more accurate production.

1 Tool Slide...has six separate power feeds ranging from .009" to .118" per revolution of the head.

2 Feed Selector... Control is provided for selection of any one of six feeds.

3 Directional Control...Lever points in direction of tool slide feed.

4 Micrometer Adjustment...graduated to .001" for tool slide adjustment.

5 Two Tool Holders...with ¾" tool bits furnished as standard equipment.

The G. & L. Continuous Feed Facing and Boring Head can be mounted on your G. & L. Horizontal in only a few minutes. It will increase the flexibility of your machine and save you machining time on many of the jobs you are now doing.

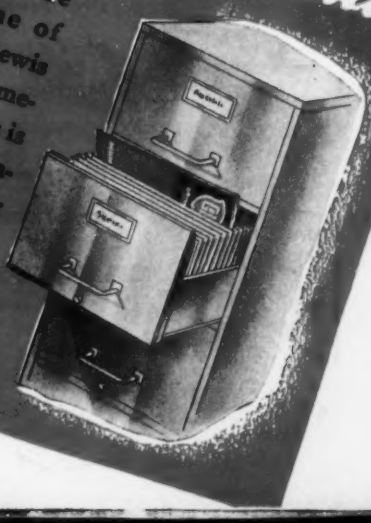
With it, you can perform facing and boring operations *simultaneously*...and obtain operations and combinations of operations not ordinarily possible with the horizontal boring, drilling and milling machines.

A wide range of standard tools can be used with this attachment. Special tools can be designed and built for any specific application within the range of the attachment.

Investigate the possibilities of a G. & L. Horizontal Boring, Drilling and Milling Machine. Giddings and Lewis engineers will be glad to work out practical solutions to your machining problems. Perhaps the addition of the continuous feed facing head or some other simple attachment will increase the flexibility of your boring mill. Call on our engineers for their recommendations. There is no obligation.

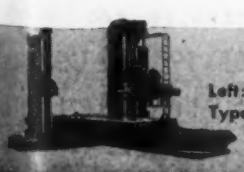
Additional Data

. . . covering the complete line of Giddings and Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin AM44.

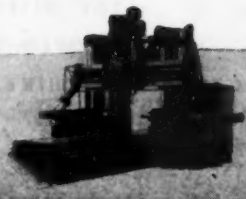


MACHINE TOOL CO.

FOND DU LAC, WIS.



Left: G. & L. Planer Type Machine.



Left: G. & L. Multiple Head Type Machine.

INVASION WILL DEMAND OUR MIGHTIEST EFFORT
Operations and Coast to Be Attacked Are Among the Most Difficult Kno
Japs Handcuff, Parade U.S. Aces
ITALIAN CAMPAIGN HELD DISAPPOINTING
Still a Long, Long Way to Tokyo, Says Admiral
Stettinius Dashes Early Peace Hope
FIGHT GROWS ON ENDU
No Quick Decision Seen
NAZIS STIFFEN
TROOP SHIP SUNK; 1,000 AMERICAN SOLDIERS DIE
DISASTER
Worst Of Its Kind
Global War Promises U.S. Much More Blood and Tears
Biggest, Costliest Battles Still Ahead of U. S., Leaders Warn
By ERNEST BARCELLA
BATTLE SEE-SAWS
Rome Landing Shows Hurdles Ahead When Allies Invade Western Europe
KEEP THAT GUARD UP America!
Ferocity of Nazi Defense Sh
Importance of Rome H
'Appalling Apathy' Seen On Home Front
'BLOODIEST YEAR' OF WAR FORECAST
Admiral Kelly Gives Warning In Urging Ship Workers to Speed Output
BOATS OFF ANZIO UNDER STEADY FIRE
Japan Pats Harsh Curbs on Nation
CLARK WARNS ARMY
Says Allies at Beachhead Are Outnumbered— Sees Fresh Blow
GERMANS FIGHT HAR
Nazis Plan Floods To Halt Invasion
NAZIS REOPEN PUSH
U. S. FLIERS
Held Up To Ridicule
Goebbels Predicts More Fanatic Nazis Once That German 'Victory Is in the Ba
Says Boys Feel Forgotten
Hal Boyle Reports They Think There's an Inequality of Sacrifice in War.
114 U.S. Fliers Down In Alps, Nazis Assert

Read the papers. Read the bad news as well as the good news. You're bound to reach one conclusion—this war is not won. We can still lose. Keeping that guard up means more and harder work, more bond buying, more intensive development of the means of Victory. Here at General Machinery we're realists... and we're keeping on building heavy machinery, cannon, diesel and steam engines, for NOW.

GENERAL MACHINERY CORPORATION

GENERAL MACHINERY

CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS CO.

THE HOOVEN, OWENS, RENTSCHLER CO.

GENERAL MACHINERY ORDNANCE CORPORATION

"A SOLUBLE OIL for heavy duty cutting as well as grinding? IMPOSSIBLE!"
"I ate those words—and gladly—when I saw MARATHON #82 E.P. SOLUBLE OIL perform"

"IMPOSSIBLE" JOBS are the kind Ohio Oil lubrication engineers like to tackle. They've come through before—and they've come through, *again.*

Today, you *can* use a soluble oil, not only for heavy-duty surface grinding, but also for cutting, tapping, even some broaching jobs. For Marathon #82 Extreme Pressure Soluble Oil is unlike any soluble oil you've ever used. It maintains lower working temperatures, permits the use of finer wheels for better finish, *prevents rusting* of finished pieces.

Expect longer wheel-life when you switch to Marathon #82. Expect less frequent dressings (up to 50% less) . . . expect faster cutting speeds in turret lathes, boring machines, drill presses, and milling machines. Marathon #82 will live up to your expectations, *and then some.*

MARATHON

A COMPLETE LINE OF CUTTING AND GRINDING OILS FOR EVERY METAL WORKING OPERATION

Write, wire or phone for an Ohio Oil Company lubrication engineer to call with convincing facts about Marathon #82 Extreme Pressure Soluble Oil in relation to your problems.

THE OHIO OIL CO.

GENERAL OFFICES: Findlay, Ohio • DISTRICT OFFICES: Robinson, Ill., Indianapolis, Ind., Louisville, Ky.

PRODUCERS OF PETROLEUM SINCE 1887

YOU CAN DO BOTH JOBS WITH ONE OIL..

INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER ASSOCIATED

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

TYCOL "DUAL PURPOSE" SULPHURIZED OIL

- *Non-corrosive to ferrous and non-ferrous metals*
- *Freer cutting, longer tool life*
- *Excellent machine lubrication*

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

Yes, you use only one oil for both cutting and cutting machine lubrication when it's Tycol "Dual Purpose" Sulphurized. This versatile oil contains a relatively high percentage of sulphur in *combined* form, making it non-corrosive to copper, bronze, brass, or steel. Permanently incorporated in the oil, the sulphur will not separate either in storage or in service.

As a cutting oil, Tycol "Dual Purpose" Sulphurized has repeatedly proved its value by stepping up cutting speeds, lengthening tool life, and producing finer finishes on hundreds of jobs. For example, one user reports a 33 1/3% production increase, and one-third longer tool life — plus excellent lubrication of his automatic screw machines and other machines with Tycol "Dual Purpose" Sulphurized. The fact that this oil can be used with tungsten carbide tools is an additional production advantage.

For complete information on Tycol "Dual Purpose" Sulphurized, get in touch with your nearest Tide Water office. A Tide Water engineer will give full details, and will also recommend the Tycol cutting oils and lubricants that best meet your operating needs. There is a complete line of Tycol cutting oils and lubricants for every industrial use.

OIL COMPANY

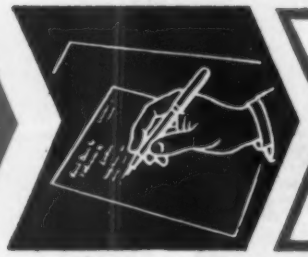
EASTERN DIVISION:
17 BATTERY PLACE,
NEW YORK 4, N. Y.

Gasoline Powers the Attack—
Don't Waste a Drop!

Principal Branch Offices: **Boston • Philadelphia • Pittsburgh • Charlotte, N. C.**
Tide Water Oil Company of **Canada, Ltd.** • **Toronto** • **Montreal**

You Save[1] and Save[2] and Save[3] a

1 SAVE ORDERING TIME



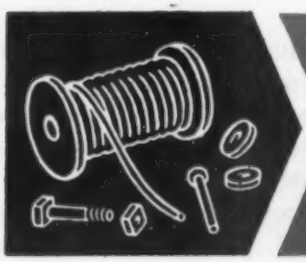
Instead of buying two separately mounted devices—a motor-circuit switch and a magnetic starter—you buy one factory-co-ordinated unit that controls and protects your motor. Simply specify the motor rating and indicate the type of motor-circuit switch you want—and we'll send you the control you need.

2 SAVE INSTALLATION TIME

Users report a 50 per-cent reduction in mounting time, 40 per-cent reduction in wiring time, as compared with the installation of two separate devices. You mount one device—not two. You connect only nine terminals—not fifteen. You get your motors into operation quicker.

3 SAVE MAN POWER

By eliminating one complete mounting job on every installation, you save valuable man power. And because the cover cannot be opened while there is power on the starter, your men have more protection against accidental injury.

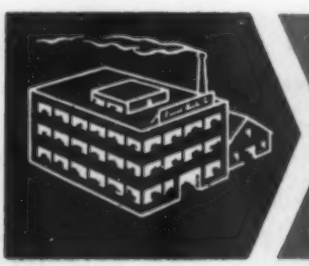


4 SAVE CRITICAL MATERIALS

By buying both the motor-circuit switch and the magnetic starter as one compact unit, you save copper wire, steel conduit, and fittings that are necessary for installing two separately mounted devices—plus the saving gained by using only one steel enclosure instead of two.

5 SAVE MONEY

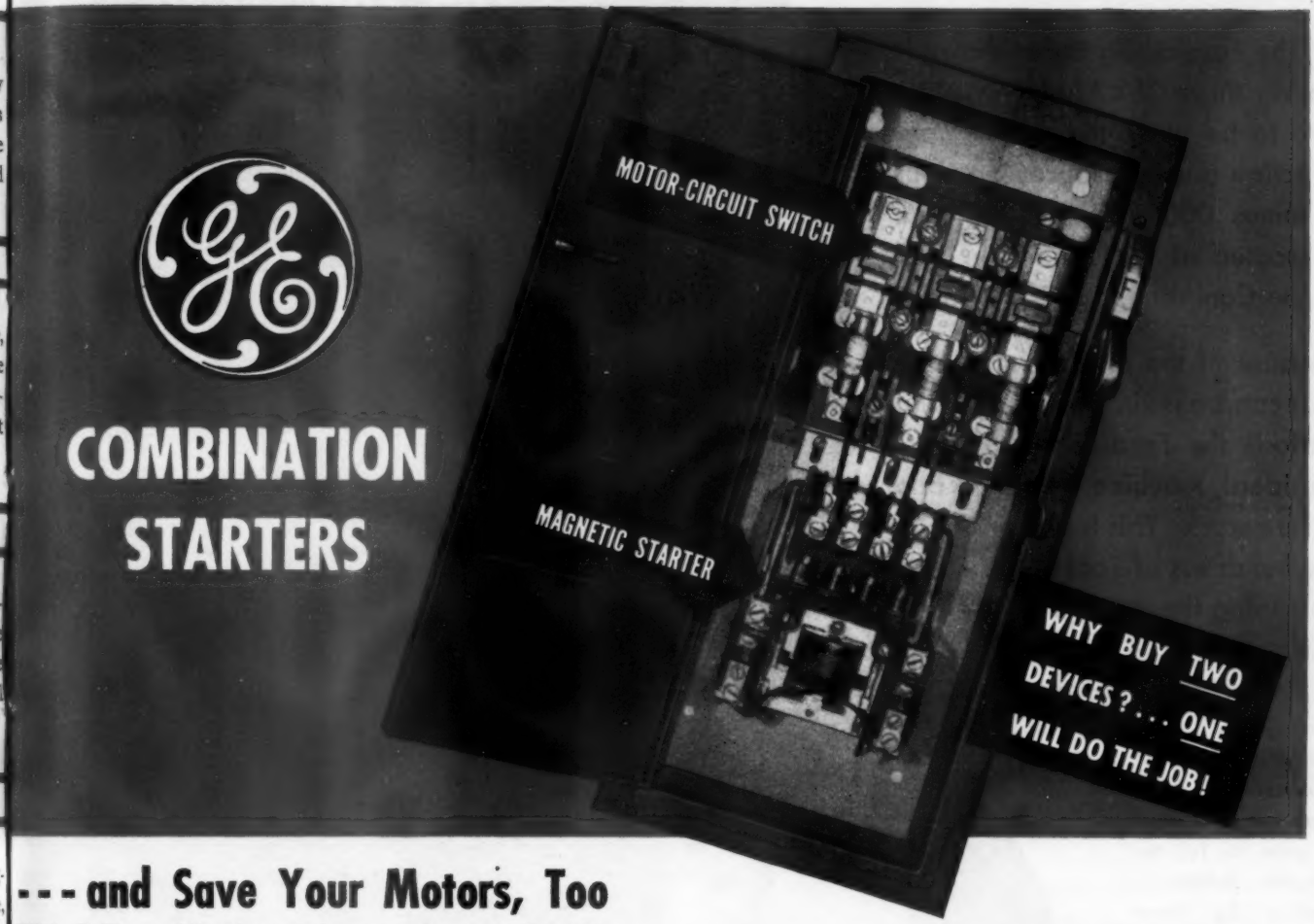
Combination starters cost slightly more than two separately mounted devices, but this difference is more than made up by the savings in wire, conduit, fittings, and installation-labor costs. This statement is based on the actual experience of users.



6 SAVE PLANT SPACE

Combination starters take up less mounting space than separately mounted safety switches and starters. Because of this you can mount them in small, unused places near the operators.

and Save[4] and Save[5] and Save[6]...



COMBINATION STARTERS

- - - and Save Your Motors, Too

With G-E combination starters, you're sure that the motor-circuit switch or breaker has the proper rating and interrupting capacity for the magnetic starter with which it is used. The fuses or breaker are coordinated with the thermal overload relays to give complete motor protection under short-circuit or overload conditions.

It's the simple, logical way to get control and protection for your motors—in one compact, easy-to-install unit. Why buy two devices, when this one will do the job?

NAME YOUR HAZARD

G-E combinations come in enclosures to meet any operating condition: dust-tight, watertight, oil-immersed, general-purpose, or for hazardous locations. Available for motors from 1 to 1000 horsepower.

GENERAL ELECTRIC

Next time you order motor control, save seven ways by specifying General Electric combination starters.
General Electric Company, Schenectady, N. Y.

Every week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.

General Electric Company, Section N 676–129
Schenectady, N. Y.

Please send me the bulletins checked below:

- GEA-3715—Combination starters: general-purpose, watertight, and dust-tight
- GEA-3660–2300-volt combination starters
- GEA-3804—Combination starters for hazardous locations
- GEA-3541—Oil-immersed starters

Name.....

Company.....

Address.....

City.....State.....

8920

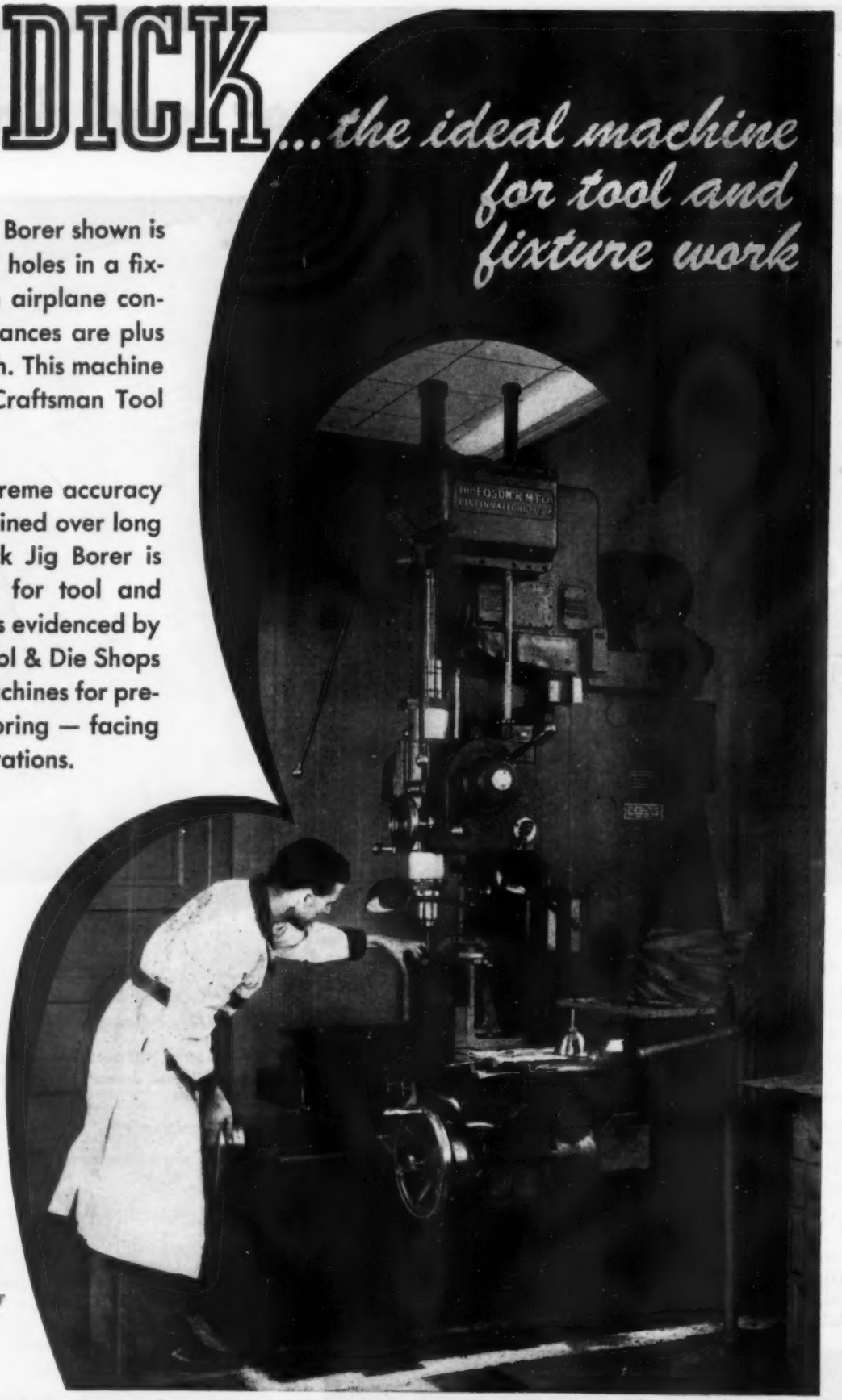
FOSDICK

...the ideal machine for tool and fixture work

● The Fosdick Jig Borer shown is boring three 1⅛" holes in a fixture to be used in airplane construction and tolerances are plus or minus .0002 inch. This machine is located at the Craftsman Tool & Die Company.

Because of the extreme accuracy that can be maintained over long periods the Fosdick Jig Borer is an ideal machine for tool and fixture work. This is evidenced by the hundreds of Tool & Die Shops now using these machines for precision drilling — boring — facing — and similar operations.

Consult a Fosdick representative on your close tolerance work or write for full descriptive bulletin — Fosdick Jig Borer J.B.A.



ARMY E NAVY

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO

A CARLTON RADIAL DRILL

"On Top" of a huge Naval Ordnance Job . . .

● Illustrated is a Carlton 5A, Radial Drill with 26 inch column and 10 foot arm tapping holes in a huge gun slide for our rapidly increasing Navy.

This is typical of the way Carlton Radials are "getting on top" of a vast number of vital war jobs in plants all over the country.

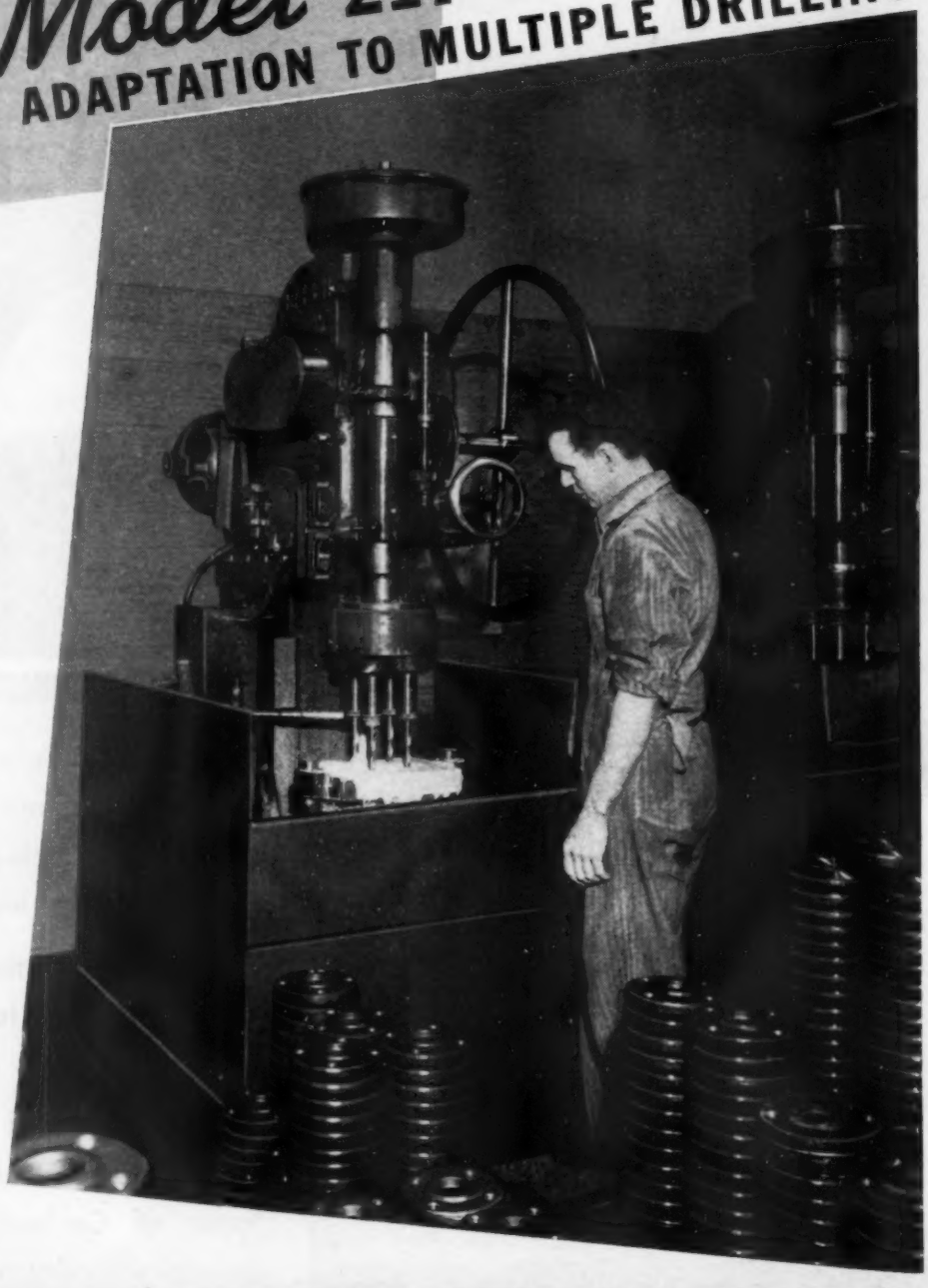
It also demonstrates the many advantages of Carlton low hung drive to spindle whereby the main driving gears are carried below the arm and power is applied on the largest diameter of the spindle nearest the cutting tool.

For power, speed, accuracy — put your next job on a Carlton Radial.

CARLTON
MACHINE TOOL CO.
Manufacturers of
RADIAL DRILLS *exclusively*
CINCINNATI 25, OHIO, U.S.A.

BAKER

Model 217 OFFERS EASY ADAPTATION TO MULTIPLE DRILLING



Shown is a standard BAKER Model 217 . . . furnished equipped with extra heavy duty fixed center multiple heads for drilling four holes in steel forging flanges, sizes 1½" to 2½". The machine was furnished with BAKER flanged quill spindle for better adaptation of multiple heads. This arrangement permits quick changing of multiple heads. Machine design is such that several may be installed side by side, thus enabling the operator to handle more than one machine.

Here again the flexibility of BAKER machines is demonstrated. It's important to remember that this versatility will mean fast, easy conversion of BAKER units from War-time operations to Peace-time work.

Write for information and engineering help on your special problems.

ARMY E NAVY

BAKER BROTHERS, INC. • Toledo, Ohio, U.S.A.

DRILLING • BORING • TAPPING

Our Motto Since 1867: "Machines Sturdy and Efficient, as Fine as Can Be Built..."

FOR ACCURATE AND FAST GRINDING ···INSTALL Nº 5's NOW

ON CLOSE-TOLERANCE HIGH-PRODUCTION JOBS — many users of No. 5's are maintaining steady production to .0001" limit and fine micro-inch readings.

STURDY PRECISION CONSTRUCTON and ease of operation mean getting out the work on time and ACCURATELY. **Recessed base** (originated by Brown & Sharpe) permits working in a sitting position with the same convenience and rapidity of operation as when standing.

The Brown & Sharpe No. 5 Plain Grinding Machine is ideal for small parts production grinding. Besides regular table travel as standard the machine may be ordered with the following additional equipment — independent automatic cross feed (for straight-in-feed grinding) — wheel slide rapid travel — and wheel spindle reciprocating arrangement. We can make prompt shipment.

BROWN & SHARPE

BALANCE

ANY ROTATING PART

FROM ½ OUNCE TO 50 TONS

with **GISHOLT DYNETRIC BALANCING MACHINES***

The principle of Dynetric balancing may be used to locate, measure, and correct unbalanced forces in any part that rotates. It is the approved means of eliminating vibration to assure smoother operation, higher efficiency, and longer life. Literature on Gisholt Dynetric Balancing Machines is yours for the asking.

**A development of Westinghouse Research Laboratories.*

GISHOLT MACHINE COMPANY
1201 East Washington Avenue • Madison 3, Wisconsin

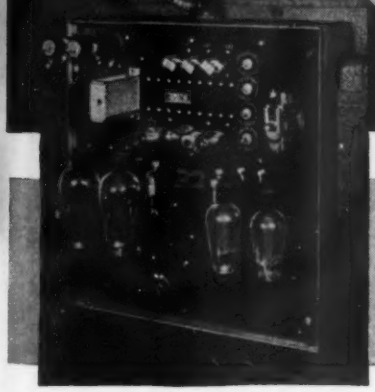
Look Ahead . . . Keep Ahead . . . With Gisholt Improvements

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINE

No. 13 IN A SERIES EXPLAINING THE USES OF ELECTRONIC TUBES IN INDUSTRY

CONSTANT SPEED regardless of load ...with G-E electronic-tube control



The G-E thyratron tube is the "heart" of the G-E Thy-mo-trol unit which keeps the grinder going at uniform speed.

WHAT happens when a "hard spot"—or a "soft spot"—is encountered in a grinding machine operation? Nothing to upset the machine's stride when the Thy-mo-trol, the G-E electronic-tube motor control, is used for supplying power to the head-stock. Increased load causes no slowing; reduced load, no overspeeding . . . G-E tubes act as either a spur or a check to the power applied as may be needed to maintain the speed at which the operator has set the machine.

G-E electronic-tube control of motors provides smooth, stepless control of an extremely wide range of speeds. It helps to insure continuous smooth-surface grinding; improve tolerances; reduce rejects—and it provides the *right* speed for each type of grinding operation.

G-E electronic-tube control is similarly applicable to lathes, drill presses, milling machines and other motor-driven machinery subjected to varying loads. The thyratron is but one of a complete line of G-E electronic tubes that are enabling many kinds of industrial machines to do their work better, faster, more economically.

Through its nation-wide distributing system, General Electric is prepared to supply users of electronic devices with replacement tubes.

"HOW ELECTRONIC TUBES WORK"

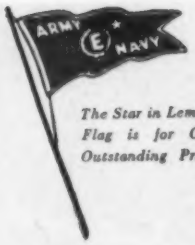
This booklet will be mailed to you *without charge*. Its 24 pages are interestingly illustrated and written in easily understood language. Shows typical electronic tubes and their applications. Address *Electronics Department, General Electric, Schenectady, N. Y.*

• *Tune in* "The World Today" *and hear the news direct from the men who see it happen, every evening except Sunday at 6:45 E.W.T. over CBS. On Sunday listen to the G-E* "All Girl Orchestra" *at 10 P.M. E.W.T. over NBC.*

G-E HAS MADE MORE BASIC ELECTRONIC TUBE DEVELOPMENTS THAN ANY OTHER MANUFACTURER

GENERAL ELECTRIC

192-CS



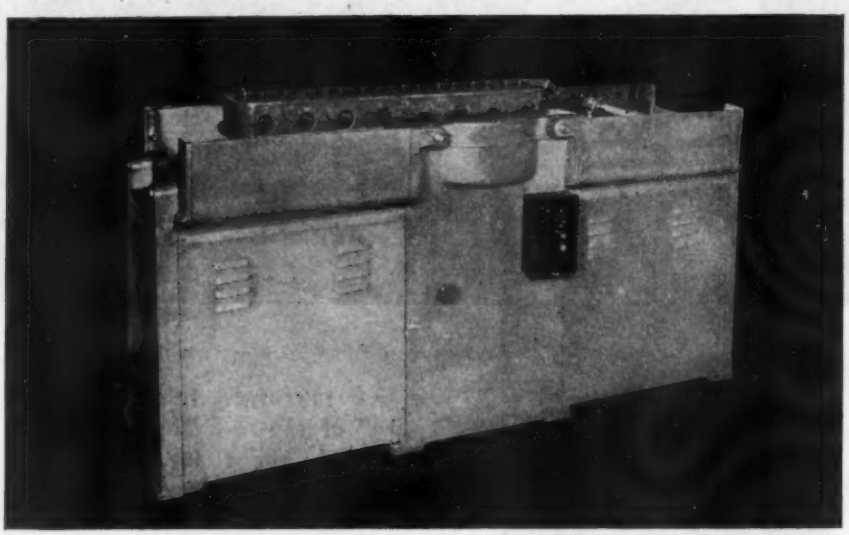
The Star in Lempco's "E" Flag is for Continued Outstanding Production.

WE USE THEM AFTER WE BUILD THEM SO THEY MUST BE GOOD!

LEMPCO

DESIGNERS • MAKERS • USERS OF PRODUCTION-PROVED MACHINE TOOLS

HORIZONTAL DISC-TYPE SURFACE GRINDERS



5 H.P. motor provides plenty of extra power. Exclusive Lempco micrometric wheel dresser assures sharp wheel and perfect grinding at all times. Length 71"; width 28"; height 33"; maximum grinding width 14"; precision ball bearing quill assembly, factory-sealed against dust and pre-loaded. Thermal relays on switch. Reasonably prompt delivery.

WRITE FOR SPECIFICATIONS

LEMPCO

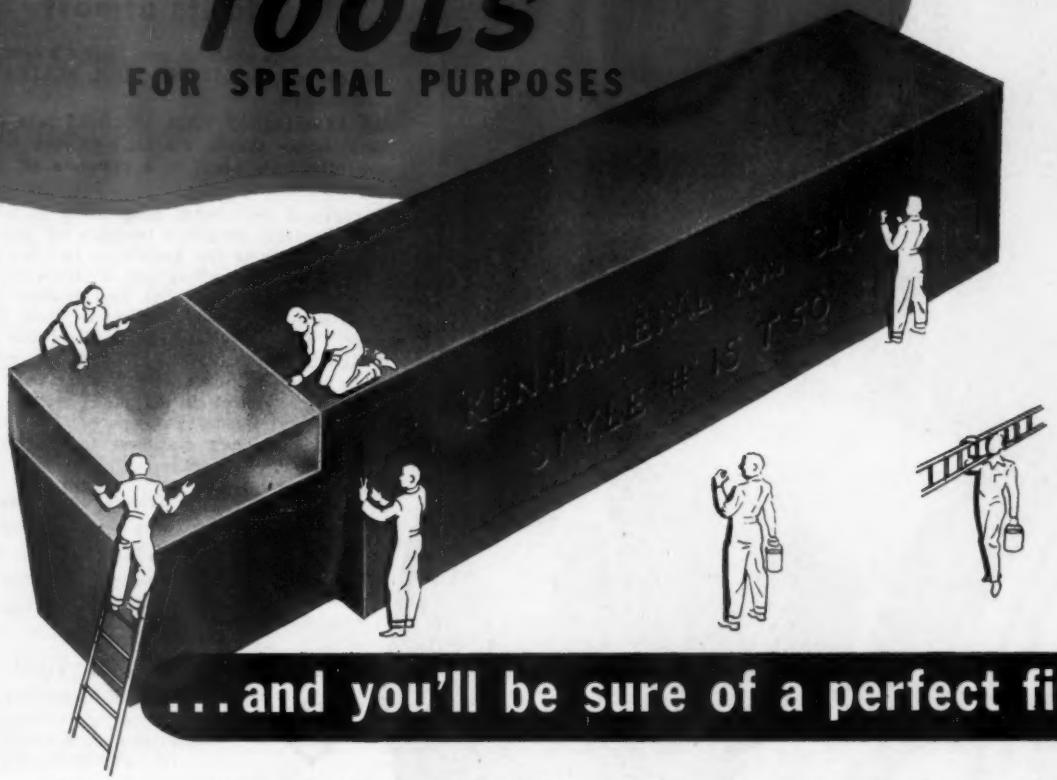
5711 Dunham Road • Bedford, Ohio, U. S. A.

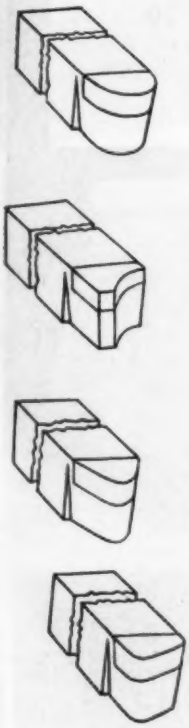
The Lempco Model DG Wet Surface Grinder pictured will produce commercially perfect finishes on the softest aluminum or the hardest alloy. Grinds surfaces perfectly flat. Makes light work of the heaviest jobs because steel guide rollers support the work. It's ideal for surfacing long castings. No set-up required for flat jobs. Positive oil-gear pump assures ample coolant to dissipate heat, prevent distortion, keep wheel clean and sharp, and eliminate grinding dust.

CEILING-PRICED!

LET US CUSTOM-TAILOR Your KENNAMETAL-TIPPED TOOLS

FOR SPECIAL PURPOSES





...and you'll be sure of a perfect fit

Fitting a carbide tool to the work is a job for specialists—and the skill with which the tool is ground is directly reflected in increased production. Kennametal standard tools will handle the majority of usual metal-cutting jobs, but even if their number were multiplied by ten, there still wouldn't be a sufficient variety. For the tool must be fitted to the work, not the work to the tool.

Our personnel is trained in the art of properly grinding Kennametal-tipped tools. A modified standard tool design produced by us gives the same high performance as a standard tool. There are no thinned-out carbide tip dimensions caused by cutting to required angles. There are no minute accordion cracks resulting from excessive heat generated by "bearing down" to hasten the grinding process.

When we supply the complete tool a simple modification often will cost less than the abrasive wheel alone that would be used up in modifying a standard tool. Even the more complicated modifications can be produced by us more cheaply, for a revision that requires hours of grinding in your shop, takes only minutes in ours. When you need modified standards call on our nearest Field Engineer. Or . . . send us drawing, sketch or blue print with angles and sizes shown. Specify grade of Kennametal or describe work. For complete instructions see our new Tool Manual. Write for a copy of it today.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., 103 LLOYD AVE., LATROBE, PA.

ARMSTRONG

That each machine tool may do its utmost

. . . *and each operator may serve his best*—provide the correct ARMSTRONG TOOL HOLDERS slotters and shapers.

All ARMSTRONG TOOL HOLDERS take cutters of innumerable shapes, are multi-purpose tools which are effectively equal to a complete set of forged tools.

Because of their ready adaptability to almost any tool situation, there is a tendency to "get by" with too few of these tool holders — two few sizes, too few types with resulting loss in efficiency.

The Armstrong System of Tool Holders comprises many sizes and shapes — Turning Tools, Threading Tools, Boring Tools, Cutting-off Tools — ARMSTRONG TOOL HOLDERS especially designed for every operation. Each embodies the most efficient tool design, correct cutting angle, greatest strength, rigidity or resiliency as required, and the proper tool approach and maximum tool clearance and convenience.

Buy ARMSTRONG TOOLS from your Supply House

Provide each machine tool with a complete set of ARMSTRONG TOOL HOLDERS so that all can do their utmost on every operation.

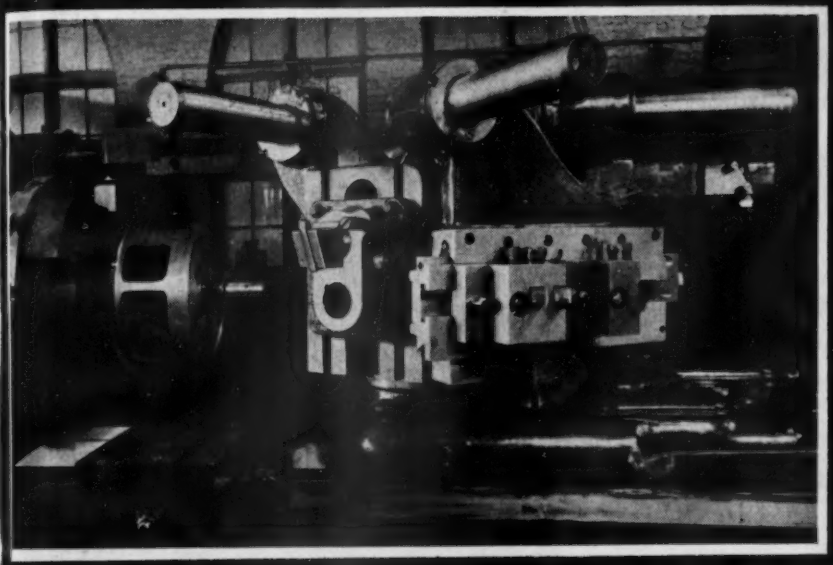
ARMSTRONG BROS. TOOL CO.

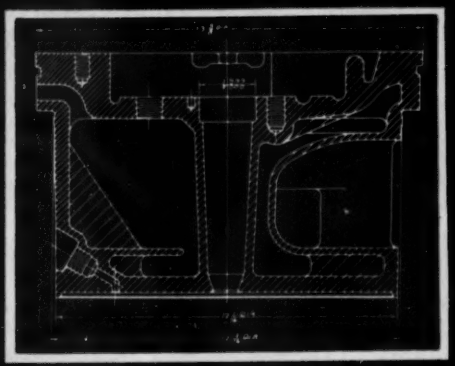
"The Tool Holder People"

315 N. Francisco Ave., Chicago 12, U.S.A.
Eastern Sales Office:
199 Lafayette St., N.Y.

ARMSTRONG TOOL HOLDERS Are Used In Over 96% of the Machine Shops and Tool Rooms

RE-TOOLING by P&J ...will convert PRESENT MACHINES to FUTURE NEEDS . . . and maintain low cost production





MACHINING DIESEL ENGINE HEADS

The special tooling of this 5-DE P&J Automatic resulted in a new low in operating costs in the production of diesel cylinder heads. Floor to floor time for each of the four operations performed proved beyond question the savings possible with a P&J Automatic tooled for a specific job.

WHAT IS *Your* POST WAR JOB?

To convert present P&J machines, tooled for today's needs, to meet post-war requirements is both possible and advantageous —*when the job of retooling is assigned to P&J engineers.* A machine tooled for producing diesel cylinder heads today, for example, can be readily converted to the machining of almost any part of equivalent size, with definite assurance of fast, low cost and convenient handling of the new job. The reason is simply this: P&J machines lend themselves to a wide range of tooling and when conversion is necessary, P&J has the experience required to develop, build and apply the re-tooling best adapted to the work at hand.

If you have a present or post-war production problem involving P&J Automatics, explore the possibilities of P&J RETOOLING SERVICE.

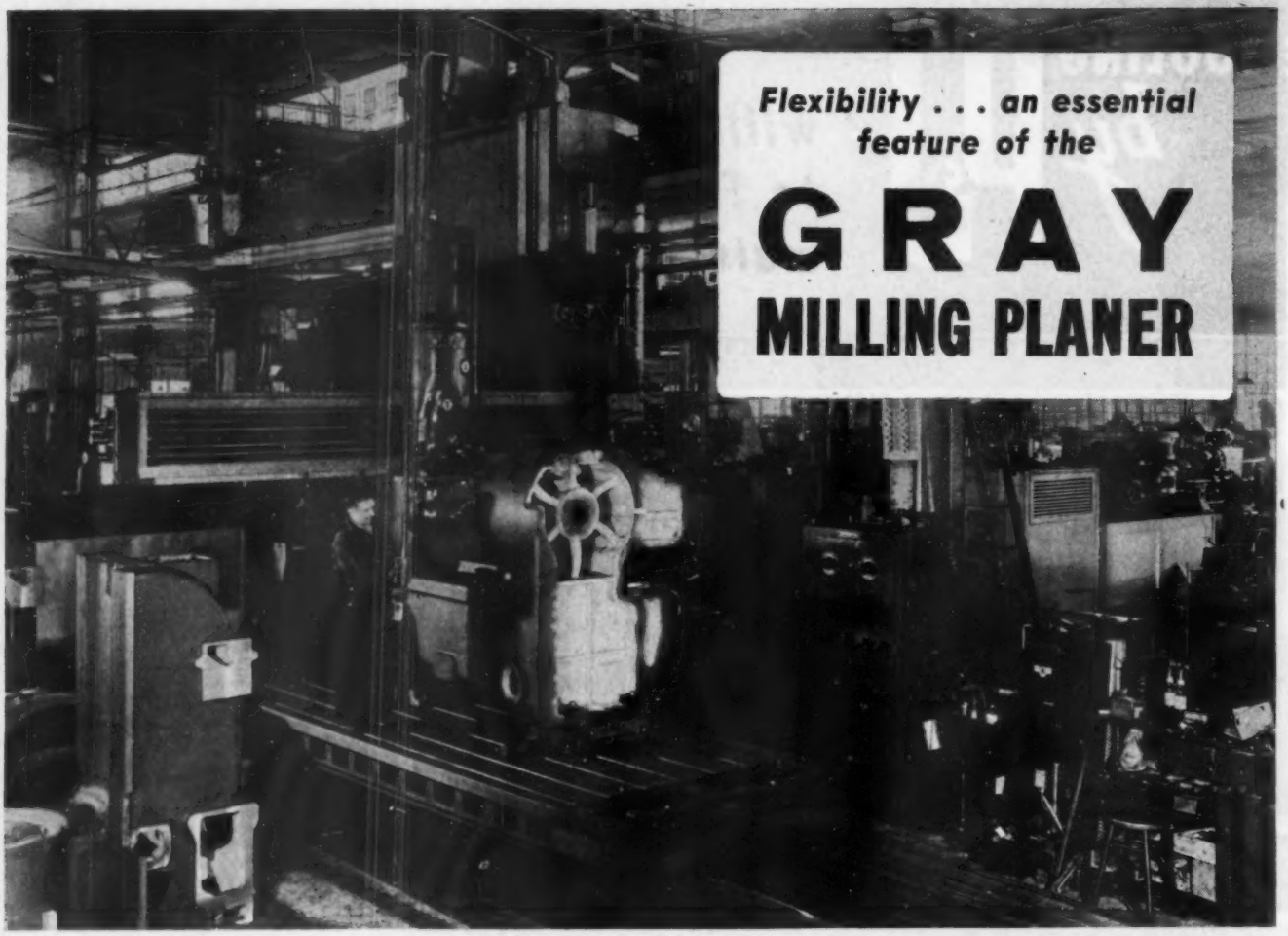
P&J
REBUILDING SERVICE

Present P&J Automatics can be completely rebuilt and returned to their original performance. Users of P&J machines are invited to investigate this service and the opportunity of retooling while machines are in our shop for rebuilding.

Buy BONDS and BREAK BONDAGE

POTTER & JOHNSTON MACHINE CO.

Pawtucket, R. I., U. S. A.



Flexibility . . . an essential feature of the

GRAY MILLING PLANER

● The flexibility of the Gray Openside Milling Planer is clearly demonstrated in this view of a milling planer machining the base of a Bullard "Cut Master" Vertical Turret Lathe.

On this particular job a milling operation is being performed. However, this Openside Milling Planer can be used as well for planing, drilling and boring. Here is a particularly versatile machine offering a wide range of operations on all types of work. It also permits performing several operations from one set-up. But the real economy of this machine lies in the fact that all these advantages are made possible by an investment in *one* machine.

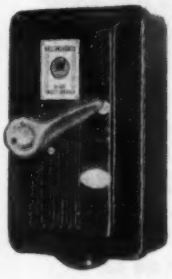
Thus a Gray Openside Milling Planer in addition to being rigid and producing a wide range of precision work offers unusual economies of operation.

Consult Gray on your planing—drilling—boring—and milling operations or ask for the Gray Milling Planer bulletin for full details on construction—range of work—economy of operation.

THE G. A. GRAY COMPANY
Cincinnati Ohio, U. S. A.

THE GRAY LINE—Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Borir. Machines.

Hot arcs stopped *Cold!*

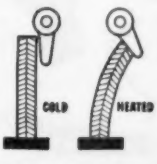


A circuit breaker must work fast . . . pass harmless overloads without interruption . . . yet when danger threatens, it must open the circuit and quench the arc—quick!

Westinghouse "De-ion" Circuit Breakers do this—and protect themselves, too—burns and pits are minimized, contacts last longer.

To restore service instantly, once the disturbance is cleared, simply flip the indicating handle. No waiting—no repairs—no parts to replace.

Protect equipment and circuits with Westinghouse "De-ion" Circuit Breakers. Ratings up to 600 amperes; enclosures for nearly every type of service. Call your Westinghouse Representative today. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N. J-21297



DEFENDING THE CIRCUIT is the job of this Westinghouse Bi-metal element. Two metals which react differently to heat are bonded together. Threatening overloads cause the Bi-metal to bend, tripping the interrupting mechanism and opening the circuit—*before* any damage is done.

STOPPING ARCS COLD is the task of the "De-ion" arc quencher . . . consisting of parallel metal plates in the form of a grid. It draws the arc into the quenching chamber, divides it into segments . . . smothers it between the plates . . . in the space of a half cycle.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

"DE-ION" CIRCUIT BREAKERS

SAVE TIN

AND SPEED UP PRODUCTION OF SMALL PARTS

With these resistance-welding controls, jobs take half as long as soldering

They cut down rejects by providing accurate control of current and time.

They save time by quick, finger-tip adjustment of current and time settings for different welding conditions.

CR7503-A136

This compact, half-cycle, thyratron control panel has a built-in transformer. It can be installed on, or mounted under, the assembly bench. A calibrated dial on the front of the panel provides easy adjustment of the weld time.

PRODUCTION rates are being stepped up more and more through the use of new and improved, electronically controlled, bench and tong welders. With these welders, the jobs that were impossible yesterday, are done quickly and easily today. With tin and time at a premium, many manufacturers who formerly used soldering have now turned to resistance welding. Another big advantage of resistance welding is that properly welded joints will not come apart at high temperatures.

CR7503-A133

This control panel, electrically the same as the CR7503-A136, but designed for wall mounting, has no transformer with it. Useful where space is limited, as the control can be remotely located.

NEW TONGS FOR THESE CONTROLS

These tongs are used with either of the half-cycle controls described when welding small parts in a restricted space. Especially suitable for welding solid or stranded wire to metals such as copper, brass, bronze, steel, ferrous alloys, etc. Tongs are equipped with replaceable tips, and will take other tips made by the user for individual needs. Flux or solder is unnecessary, and the pressure for the weld can be accurately adjusted on the pistol-shaped handle. The weld is made automatically when pressure is exerted on this handle.

Do these controls "fill the bill"?

If you would like complete information on these controls and welding tongs, send today for bulletin (GEA-3045). If these controls aren't the answer to your problem, let us know. We have a complete line of electronic controls for resistance welding. *General Electric, Schenectady 5, N.Y.*

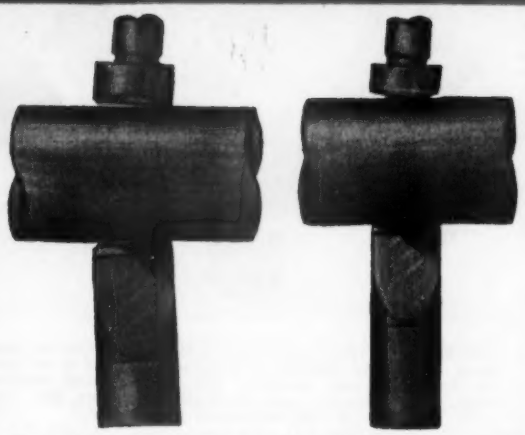
RESISTANCE-WELDING CONTROL

BUY WAR BONDS

GENERAL ELECTRIC

STANDARD SUPER *Snap Gage*

with SPHERICAL Gaging Pins that involve no condition of parallelism, yet provide GREATER ACCURACY in PRECISION INSPECTION



Conventional Snap Gage with flat surfaced gaging pins. The tilt is exaggerated to make the diagram clear. Note that only at their edges do the gaging surfaces contact the piece being gaged.

This illustration shows the Super Snap Gage with the pin shank at the same angle as in the diagram at the left. Note that the contact conditions are exactly the same as if the pin were not tilted.

This illustration shows a Super Snap Gage mounted in a bench stand for convenience in checking.

IMMEDIATE DELIVERY from stock

A *new contact principle...* SIMPLE *and* PRACTICAL

SNAP GAGES are commonly used to control finer tolerances, but strain on the locking device distorts the frame thereby rendering the gage inaccurate. This distortion tilts the flat surfaced pins a few .0001" throwing them out-of-parallel to the common anvil, an important factor when tolerances are measured in .0001".

The STANDARD Super Snap Gage with its SPHERICAL gaging pins eliminates out-of-parallelism. This new spherical-contact principle involves no condition of sustained parallelism. The SUPER Snap Gage is easily set, requiring no simultaneous adjustment to a given dimension and to parallelism. It simplifies inspection, assures greater accuracy, and speeds production and inspection.

The return of out-of-parallel snap gages for correction is eliminated. Only pins and anvils need be held in reserve, instead of complete gages. The initial cost of the SUPER Snap Gage is no more. Pins are available as separate parts, to fit existing American Gage Design models.

Send for Illustrated Folder

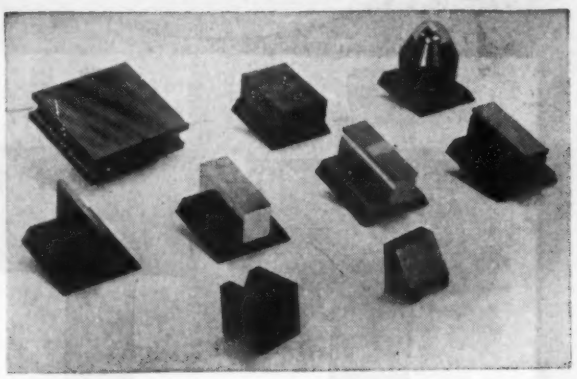
STANDARD GAGE CO., Inc., Poughkeepsie, N.Y

AN INVITATION TO PRODUCTION MEN with INSPECTION PROBLEMS

Many shops, confronted with unfamiliar types of work, often find it difficult to speed up and simplify inspection because of a lack of the right instruments and attachments for proper and efficient handling of inspection. Our engineers have rendered valuable aid in solving many of these problems.

The SCHERR COMPARITOL, which is the basic instrument for a wide range of inspection, may be readily adapted to measuring work to an accuracy of 1/10,000" or closer. Shown here is the COMPARITOL equipped with a special fixture for checking two dimensions, one against a shoulder, on a precision ground shaft. With this fixture, the operator is enabled by simply moving the work, to inspect twice as fast as he could without this work-supporting attachment.

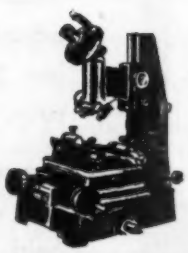
Shown here are typical anvils of various shapes and sizes for use with the Scherr Comparitol to help solve inspection problems involving all sorts of work which can be inspected on this fast, accurate measuring instrument.



SCHERR INSPECTION INSTRUMENTS are available for the convenient, quick and precise handling of inspection problems of all kinds such as checking threads, templets, dies, forming tools, angles, radii, taper, pitch diameters, cams, graduations, keyways, etc. (See some of these instruments shown below).

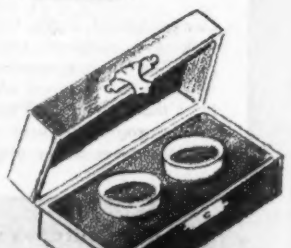
WILDER PROJECTOR for accurate measurement or comparing objects by means of a magnified shadow image.

SPENCER BINOCULAR MICROSCOPE with 3-dimensional vision, reveals surface finish, imperfections, etc.



TOOLMAKER MICROSCOPE that simplifies the magnified projection of part profiles and provides direct measurement in two dimensions as well as angular measurements.

MAGNI-RAY—a wide field illuminated magnifier for close inspection of work and operations.



OPTICAL FLATS—for testing gages and lapped parts for parallelism and flatness.

GEORGE SCHERR CO.
INCORPORATED
124 LAFAYETTE STREET NEW YORK 13, N. Y.

Machine tools give meaning to this

jury's verdict!

It wasn't much of a story. By news standards today it was strictly Page 14. The night City Editor slugged it "delinquent—local" and the man in the slot gave it a one-column head. JURY BLAMES SLUMS FOR JUVENILE CRIME.

"Health stations, more hospitals and schools, recreational and training facilities, low-cost housing projects and community centers were recommended by the grand jury, in its final presentment yesterday, as measures to check the rising tide of juvenile delinquency in this etc., etc., etc."

Few people read it. In the midst of war and politics, it was strictly Page 14.

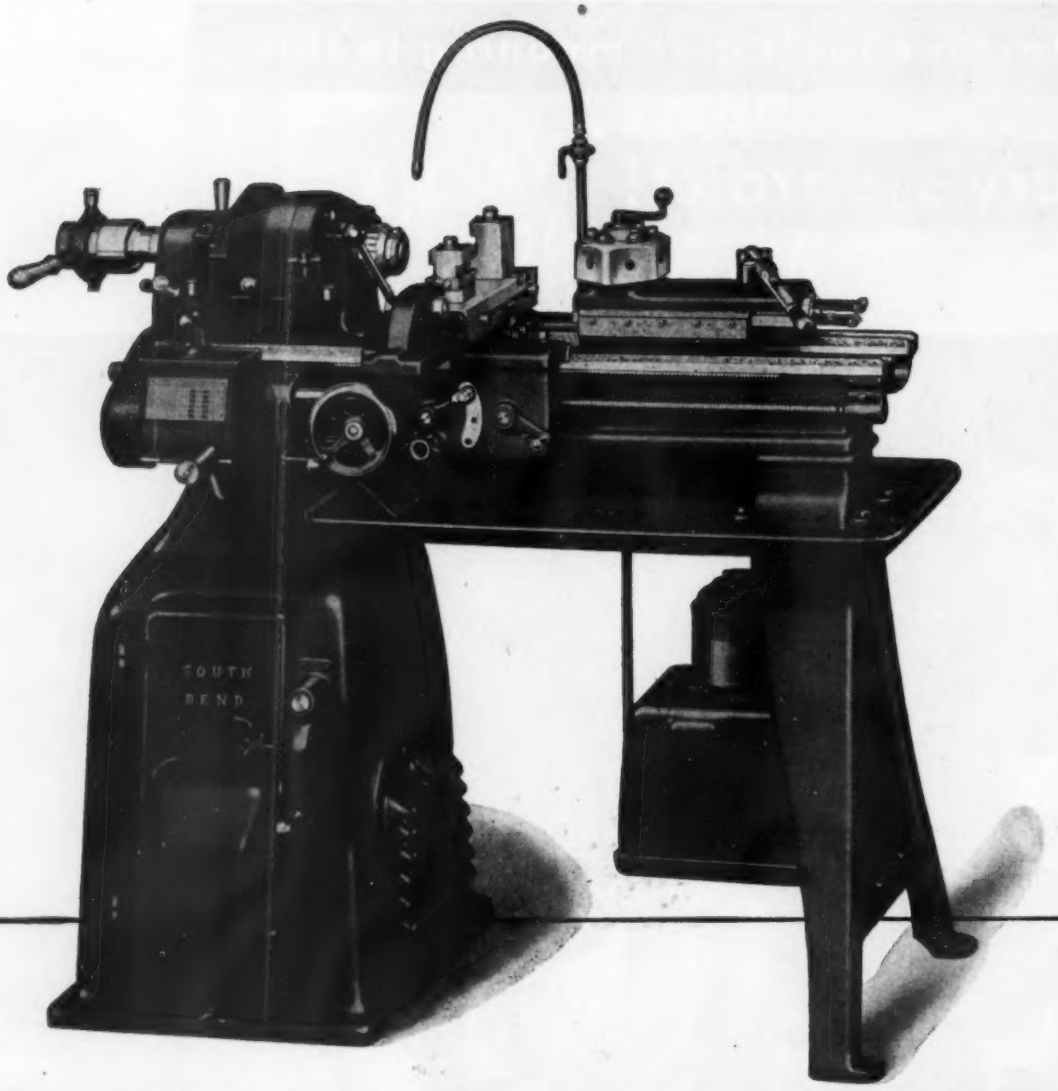
That's why we're running it. Because that story should be a Page 1 MUST in every city in America. Because that jury's verdict is a *national* challenge. Because it gives the lie to every brand of private or political complacency which turns away from one simple, unvarnished truth: Our sons are fighting for a *better* world than they left behind—and total victory is a long way off!

What has the machine tool industry to offer here? One very real contribution: The engineers of the basic machine tool producers have helped the men of government and of industry to plan the most desperate and gigantic production program of all time . . . and they can help those same men in planning today for the peace that must be won after the war is won!

One of these is a Bryant man. We invite you to send for him.

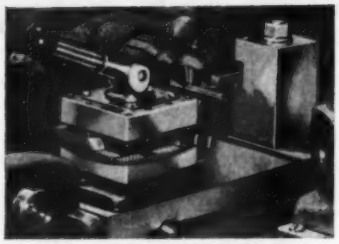
Bryant Chucking Grinder Company

SPRINGFIELD, VERMONT, U.S.A.

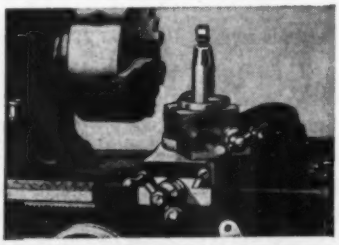


For Rapid Machining
OF SMALL PRECISION PARTS

In hundreds of important war production shops the new Series 1000 South Bend Turret Lathes are first choice for machining small precision parts. Highly efficient on all work within their capacity, these lathes are especially popular for close-tolerance, second operation jobs.



4-Way Turret Tool Block permits greater number of operations per setup. Indexes to 4 positions. Optional equipment.



Compound Rest Cross Slide, interchangeable with Handlever Cross Slide, is also supplied as regular equipment.

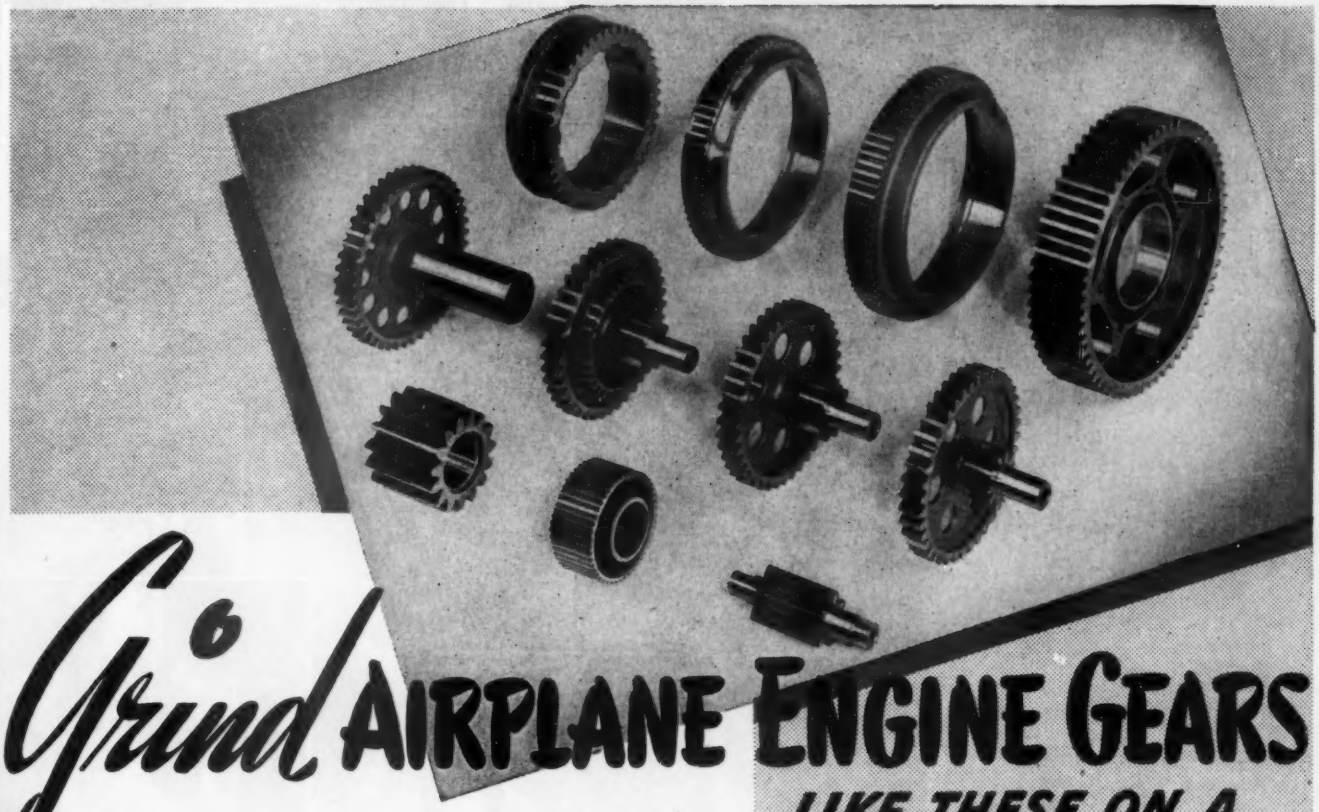
SPECIFICATIONS

Hole through spindle	1⅜″	Spindle speeds (12)	50 to 1357 r.p.m.
Collet capacity, round	1″	Thread cutting feeds (48)	4 to 224 per inch
Swing over bed and saddle wings	10½″	Universal carriage power feeds—	
Effective feed of turret slide	4″	longitudinal (48)	.0015″ to .0836″
Turret face to spindle, max.	19⅜″	transverse (48)	.0006″ to .0309″

South Bend Turret Lathes, Engine Lathes and Toolroom Lathes are made in a wide range of sizes and types. Write for catalogs and the name of our nearest dealer.

SOUTH BEND LATHE WORKS

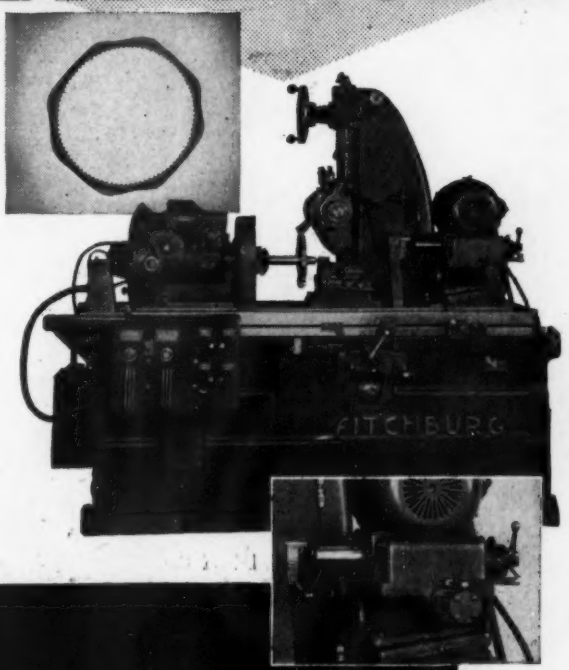
LATHE BUILDERS FOR 37 YEARS — SOUTH BEND 22, INDIANA, U. S. A.



Grind AIRPLANE ENGINE GEARS LIKE THESE ON A FITCHBURG

The internal aircraft engine gears shown here were ground on the new Fitchburg Gear Grinder. As a result Fitchburg has been commended, right down to the operator of the machine, by a leading aircraft engine manufacturer—on the dimensional accuracy and finer finish obtained. These jobs were also performed in less grinding time than was possible before.

Similar results on a variety of work can be obtained on this machine—with the same quality and high production. Let Fitchburg engineers show you how. Prepare now to meet peace-time needs with greater production at low cost.



FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Baugage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders

R Q FACE MILL

HELICAL SLAB AND END MILL

SLOTTING

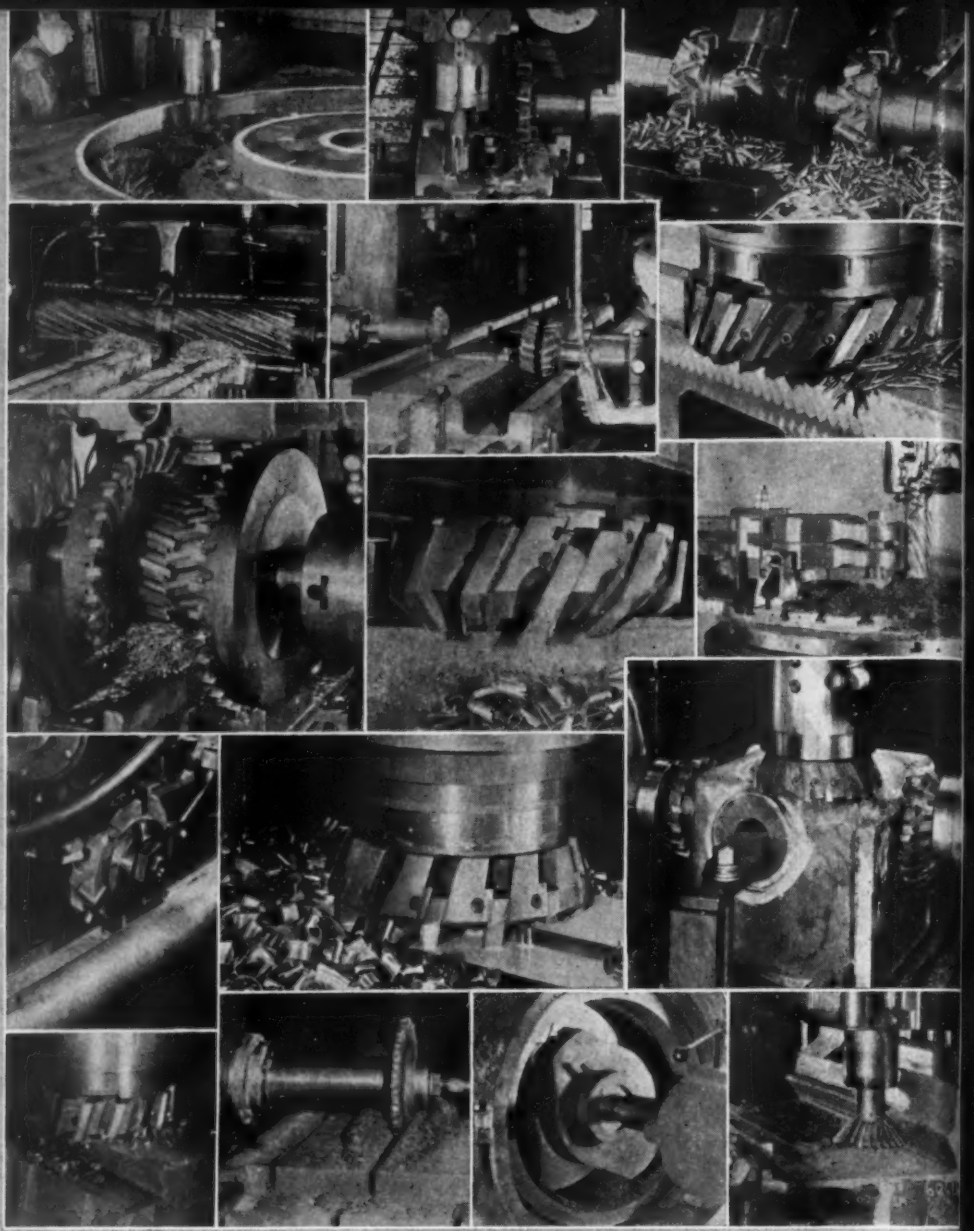
SIDE MILL

HIGH SPEED SHEAR CLEAR

TYPE N. S. FACE MILL

STAGGERED TOOTH CHANNELING

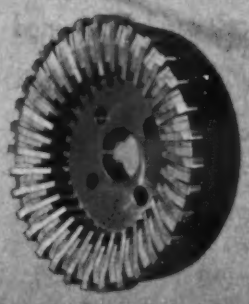
SPECIAL CARBIDE TIPPED



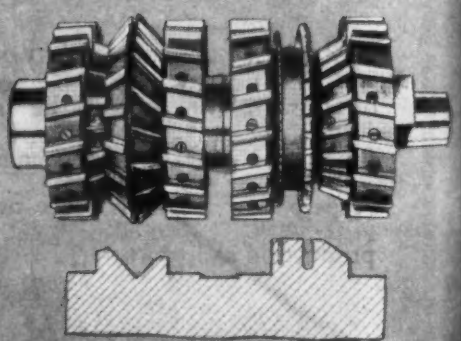
TYPE N X FACE MILL

SHEAR CLEAR FACE MILL

N X SOLID SHANK END MILL



RAY BLADE FACE MILL



CUTTER GANG

Present Ingersoll cutter designs have developed from over fifty years' experience in making tools for special Ingersoll milling, boring, and drilling machines. In addition to the standard types of inserted blade milling cutters for face milling, side milling, slotting slabbing and end milling, many special types of tools are available. Both types are illustrated above by themselves and at work.

Most of these tools may be furnished with either high speed steel, cast alloy, or carbide tipped blades. We also build solid cutters with brazed carbide tips and negative angle carbide cutters for milling steel.

We will be glad to send you a booklet (Ingersoll Milling Cutter Engineering Specification Sheets) describing our standard inserted blade cutters. Your inquiries concerning special inserted blade tools will also receive prompt attention.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

"UNION"

- the Tools you buy again

—for Accuracy that lasts on tough wartime jobs — for uniformly precise results — for continuous uninterrupted production. Each Union Tool is guaranteed to do its part for the war effort by delivering the greatest possible efficiency and output between grinds. Demand the ultimate for Accuracy . . . demand Union!

Union Twist Drill Co.
Athol, Mass.

S.W.Card
Butterfield
UNION

DIVISIONS OF THE UNION TWIST DRILL COMPANY

Butterfields!
For REAMERS geared to today's heavy high production demands.... for TAPS that can take on the tough threading assignments of precision war production and deliver the maximum service on every tapping job, whatever the machine, the material or the degree of accuracy required ....use BUTTERFIELDS and be assured of top results in the quickest time!
S.W.Card
Butterfield
UNION
Butterfield Division
Derby Line, Vt.
Rock Island, Que.
DIVISIONS OF THE UNION

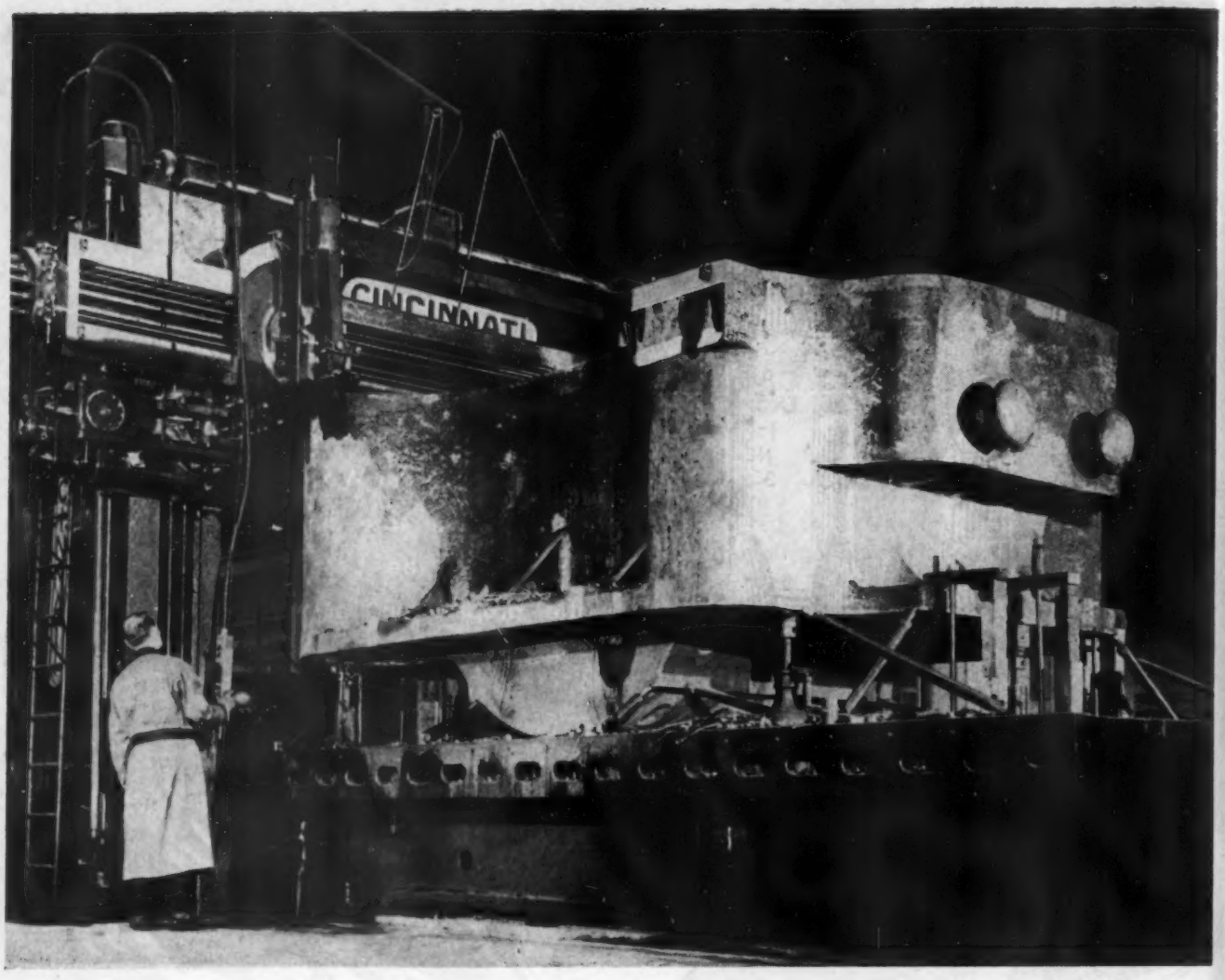
THE in-built accuracy, efficiency and stamina that have made the Card name an emblem of tap quality for many years is being applied today to thousands of war production jobs and is helping many a busy war plant improve tapping performance on work that must meet increasingly strict precision standards. We will be glad to analyze your threading problems and recommend the best procedure and the proper tap for every job. For efficient wartime service—

"—specify "Card"

S. W. Card Mfg. Co.
Mansfield, Mass.

S.W.Card
Butterfield
UNION

TWIST DRILL COMPANY



Cincinnati Illustrates Another Example of the Hypro Way

● Hypro Machine Tools are built to withstand the heaviest cuts and provide unexcelled accuracy. This is due to precision fitting of parts and the best workmanship. Cincinnati Hypro Planers, Vertical Boring Mills and Planer Type Milling Machines are designed to carry exceptional load capacities. They offer ease and convenience of operation even on the largest machines, as shown above.

● The illustration shows a 60 ton press casting being machined the Hypro Way at the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio on a 120″ Cincinnati Planer.

● You too can enjoy the numerous exclusive Hypro features and reduce your costs the Hypro Way. Write for Bulletin 136-AM describing Double Housing Planers. Buy War Bonds to pay for that new automobile which hydraulic press parts and planers like this will make possible.

THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

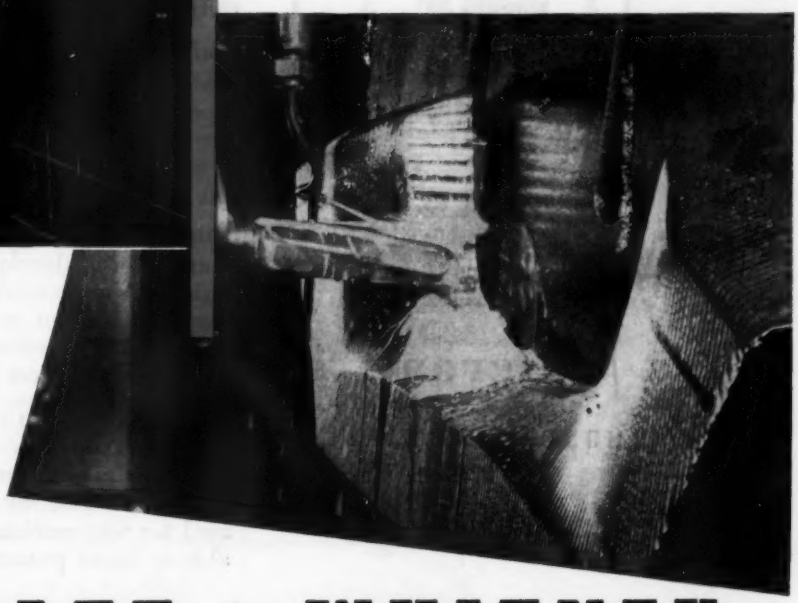
CINCINNATI . OHIO . U.S.A.

"Pre-Converted"

BUT STILL AT WAR

HERE you see the versatile Keller — the machine with the mechanical-electrical brain that was "pre-converted" for peace the day it went to war. With in-built ability to stand the gaff twenty-four hours a day, this Keller is still on its wartime job, speeding aircraft production in one of America's big plants.

But when its war work is over there will still be no rest for the Keller — no time out to be rebuilt or adapted for peace. It was pre-converted to start with, and its "brain" will function with the same speed and dexterity in shaping dies or parts for the postwar products of tomorrow. It will continue to serve the designers, engineers and production men who (soon we hope) will be setting their sights higher than ever in the coming fight to win the peace . . . to produce more and better . . . at the lowest possible cost.

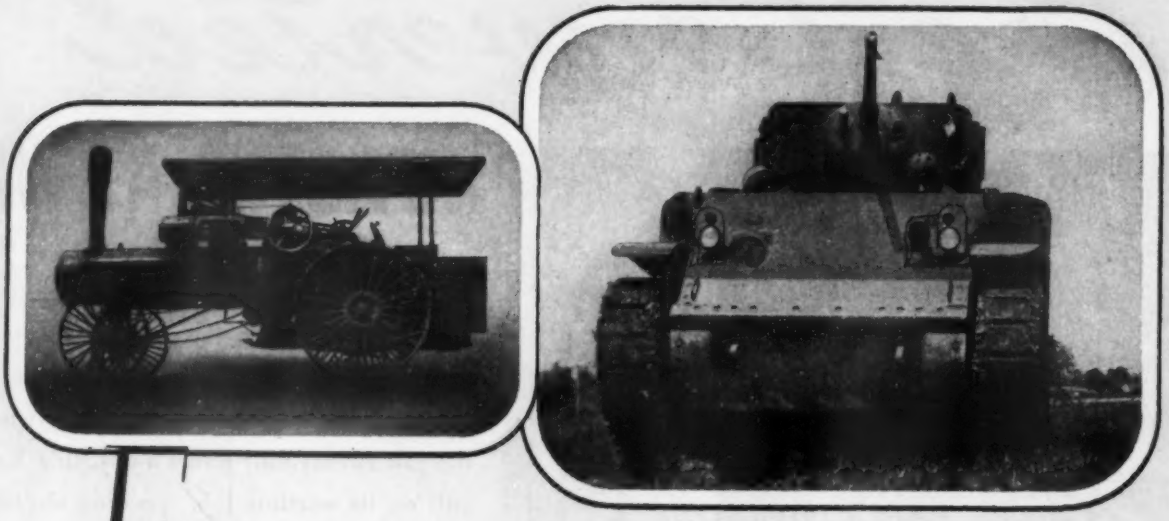


Right — Speeding aircraft production, this Keller is automatically shaping a vital part, as its mechanical-electrical brain follows the template shown at the top of the larger picture. Operator sets up the job with push buttons — the Keller does the rest.

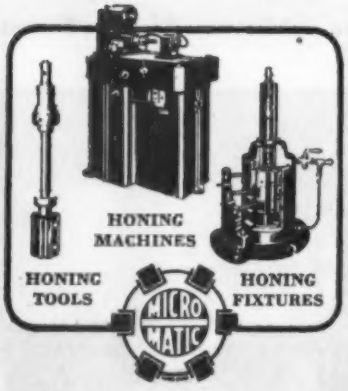
PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD, CONNECTICUT, U. S. A.



From plowshares to SWORDS ...TO PLOWSHARES



Micromatic

HONE CORPORATION

Detroit, Michigan

Yesterday—*The steam "traction engine" gave way to the gas powered crawler tractor just in time to suggest the World War I tank. It was only a crude, slow moving offensive weapon, but it promised tremendous tactical advantage. Only the use of early abrading processes made it possible.*

Today—That swift powerful engine of destruction—the modern tank—is the product of many years of combined experience in ordnance and automotive practice. Honing, the advanced abrading process, is of utmost importance in making possible this modern beating of "plowshares" into "swords".

Tomorrow—Our "swords" must again become "plowshares"—war developments always produce technological advances usable in peace. What these advances may be, we can only guess. But the fundamental process of Microhoning will be ready with new refinements to meet these needs.

This process which generates bore accuracy for roundness and straightness within .0002" to .0003"—which removes up to 65 cubic inches of stock per hour, has been developed into many ramifications, now being used for war machines. Tomorrow they will be available to speed peacetime production.

MAKERS OF HONING MACHINE TOOLS

How to Make a Sprinter out of a PILLBOX

Tons of metal—guns and ammunition—fuel—charging over a blasted landscape at 45 miles per hour—the "pill box" has become a sprinter in the modern tank.

Performance of this effective war machine depends on the modern engine power plant—the way it is designed and made. This engine must have amazing stability, durability—highest all around performance qualities. Yet it must lend itself to fastest maintenance or repair with minimum equipment.

Microhoning contributes largely to this result because it offers the most modern method of final precision stock removal and close control of surface character.

It provides a high degree of accuracy and any desired surface finish—*without* injurious frictional heat—*without* deformation of subsurface metal structure.

Without this close precision and controlled finish, modern tactical use of the tank would be impossible.

Some Microhoned Tank Bores

Gas and Diesel Engine Cylinder Bores and Sleeves • Connecting Rod Bores (Large End) • Valve Guide Bores • Diesel Fuel Injector Bores • Transmission Gear Bores • Gun Recoil Cylinders • Gun Predictor Hydraulic Cylinders • And Many Other Parts

MICRO MATIC

MICROMATIC HONE CORPORATION

DETROIT, MICHIGAN

CUTS JIG-BORING TIME 25%!

Read What Chief Tool Engineer Kennedy of Norge Division, Borg-Warner Corporation Says About

CENTERSCOPE

"We have found the Center Scope purchased from you several months ago, to be a very valuable addition to our tool room equipment.

"We have cut our jig boring time at least 25% which has avoided the necessity for sending any boring to outside shops.

"By having the bench men lay out their jigs and dies with a height gage or Johannsen Blocks and turning the job over to the boring mill hands, we have maintained closer limits on spacing and eliminated mistakes entirely.

"Spacing within .001 are easily attained and closer tolerances are possible.

"The tool makers are all enthused about this instrument and join in our recommendation of it."

Yours for Victory!

NORGE DIVISION
Borg-Warner Corporation

G. P. Kennedy
Chief Tool Engineer

Speeds Locating ...Makes Accuracy a Habit!

BETTER work at lower costs — is the universal report from shops using Center Scope, the optical locating tool. Job time estimates are being reduced, because Center Scope makes locating time shorter and gets more work out of each machine tool, from bench drill to lathe or jig borer.

Center Scope can be used without technical knowledge or training, and produces accuracy of plus or minus .0001" or better, the first time an operator uses it.

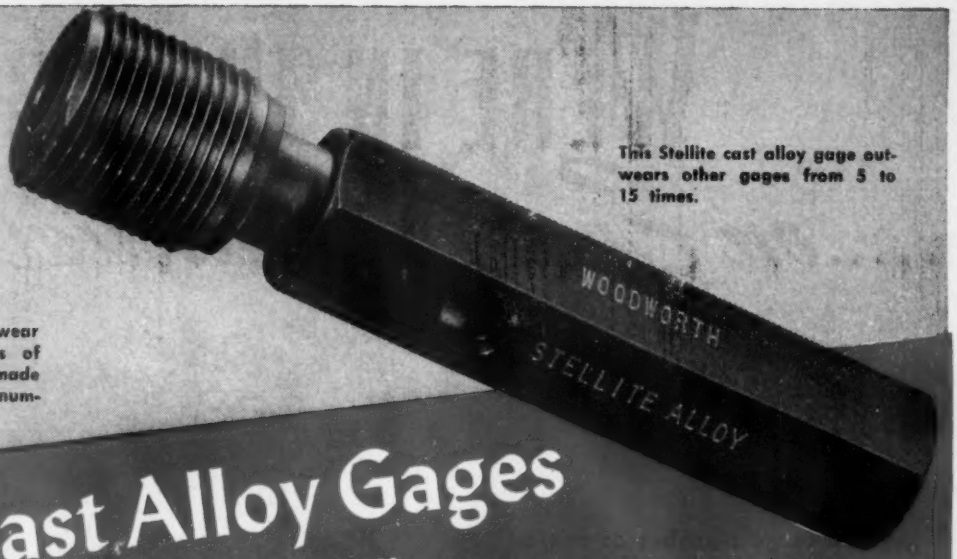
Used on any machine tool, it is a precision instrument, not affected by wear, temperature, or mechanical pressure.

Prices are attractive, too. Variable Center Scope, only $97 f.o.b. Milwaukee; Edge Block, $23 additional. For full information, write for Bulletin No. CS301.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker
Products
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

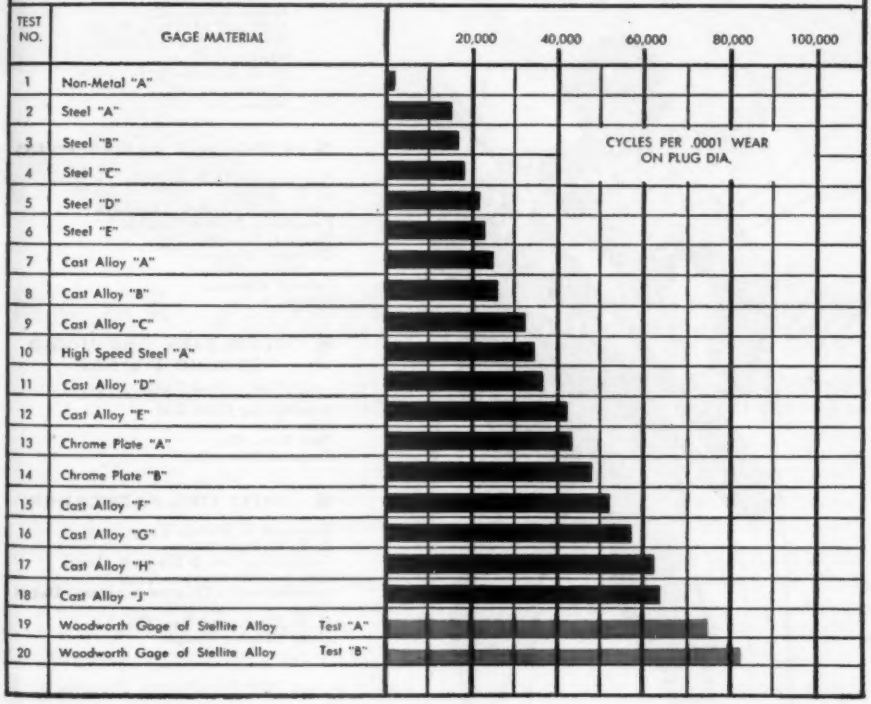


This Stellite cast alloy gage outwears other gages from 5 to 15 times.

Chart below shows by actual wear test how far Woodworth gages of Stellite cast alloy outwear gages made of other materials. Note tests number 19 and 20.

Stellite Cast Alloy Gages BY WOODWORTH Maintain Accuracy Longer

AVERAGE RESULTS ON WEAR TESTS OF VARIOUS GAGE MATERIALS



To test this gage, Woodworth engineers used a specially built wear-test machine — subjecting it to punishment far more severe than in any actual gaging operation. The results of these tests show how effectively Stellite alloy resists abrasion.

It was this and other important characteristics of this metal that led Woodworth engineers to develop the new, tough cast alloy gage which Woodworth offers to manufacturers today — after months of expert research into processing methods.

One important user of this gage says, "Binding and 'freezing' of gages was a problem before we switched to this material."

Write for folder 44-S.

ACCURACY YOU W CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD · DETROIT 20, MICHIGAN

PRECISION GAGES · GROUND THREAD TAPS · FORM TOOLS · PRECISION MACHINED PARTS · HEAT TREATING · PLATING

WE'RE IN THE FIGHT...
...on Every Industrial Front!

IN a large number of major war industries, equipment that was designed and fabricated by Kirk & Blum is increasing plant efficiency, speeding production, cutting costs, reducing absenteeism . . . helping to win the war.

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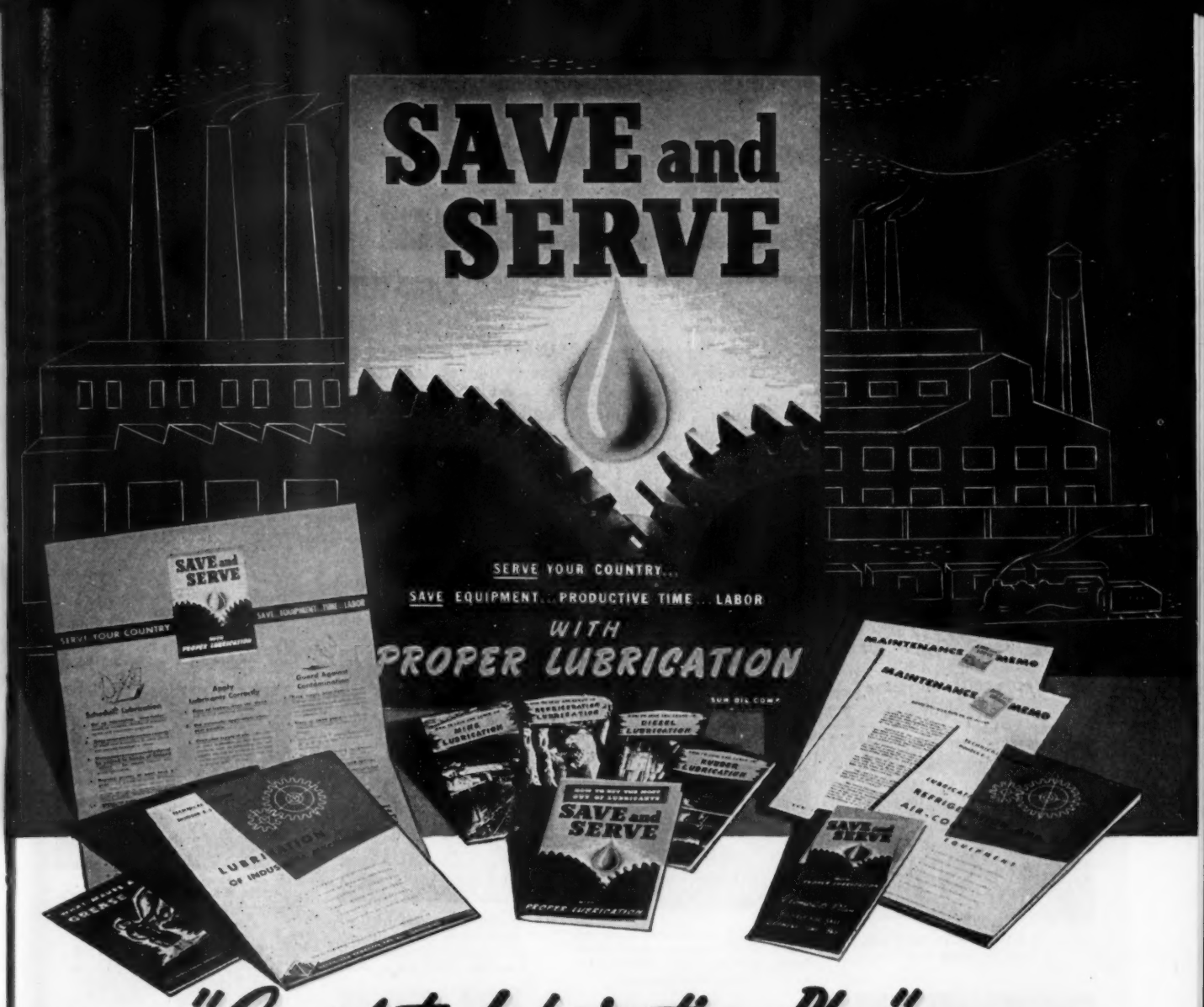
★ END IT QUICKER . . . BUY MORE WAR BONDS!



HERE IS A *"Complete Lubrication Plan"* THAT WILL

HELP YOU SAVE EQUIPMENT... PRODUCTIVE TIME... LABOR

Your equipment must last through the war . . . into the conversion period . . . and far beyond. Breakdowns and "wear-outs" must be sidetracked with efficient maintenance—proper lubrication.

That's the purpose of this SAVE and SERVE plan . . . to place in your hands the "know-how" of proper lubrication . . . to help you establish the practice of proper lubrication throughout your plant.

This plan is practical and easy to use. It has been prepared by Sun Lubrication Engineers to give you the benefit of their broad experience. The SAVE and SERVE Plan includes plant poster, wall chart, lubrication manual, technical bulletins, performance folders and maintenance memos. It will aid every man in your plant who is concerned with the operation of machinery to make it run better and last longer.

Put Sun's SAVE and SERVE Plan to work in your plant! It's yours for the asking, to help you save vital equipment . . . productive time . . . and labor. Write today for the folder which gives you the complete details . . . tells you how to get all of the material.

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--The Patented Collet assures the Precision of the

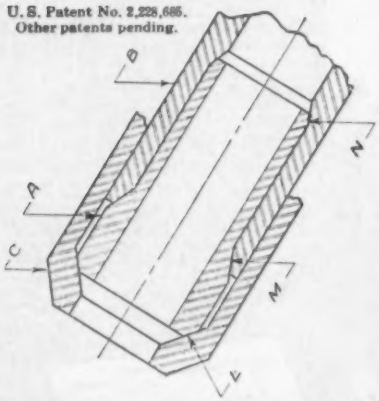
ERICKSON Precision COLLET CHUCK

Collapses 1/32 in.—Retains Gripping Strength and Accuracy.

Model "01" accurate within .0005 or less at the nose. **Model "02" accurate within .001 or less at the nose.**

Collet open at both ends.

U. S. Patent No. 2,228,685. Other patents pending.



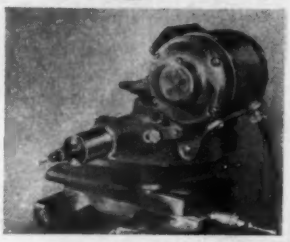
PRINCIPLE

The drawing (left) illustrates the revolutionary principles embodied in the Erickson Precision Collet Chuck.

Collet "A" is automatically lined up concentrically with the axis of the Shank "B" by two Cam Surfaces of the Collet "M and N" mating with the Cam Surfaces of Shank. The Shank and Collet Cam Surfaces are mated to within .0001 inch.

This action aligns Collet with the Axis at the Center of Shank, allowing it to be drawn back by Collet Cam Surface "L" and Nose Piece "C".

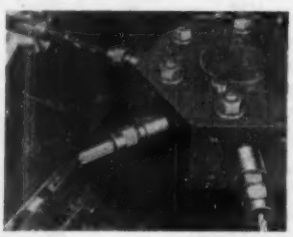
Due to the fact that collet is open slotted at both ends, Collet "A" then collapses equally throughout its length to maintain a vise-like grip and remain in perfect alignment with the Axis of Shank.



Tool Post Grinder equipped with Model 301 Chuck.

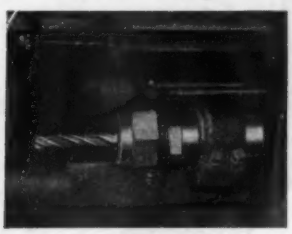
One ERICKSON COLLET will replace 7 standard, single purpose Collets.

Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.



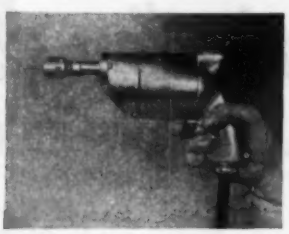
Model 102 Chucks for drilling and tapping operations on Turret Lathe. Jobbers Drill stubbed on chuck in foreground.

Model 201 used in drill press. Extra long drills can be used, by extending them from the chuck as they wear.

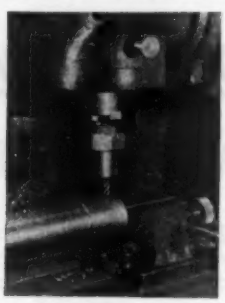


Model 402 Chuck in use on Automatic Screw Machine. Drill gripped on flutes.

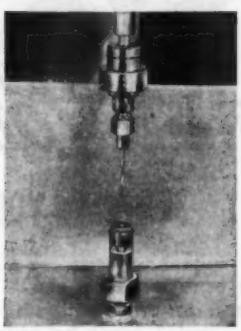
Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.



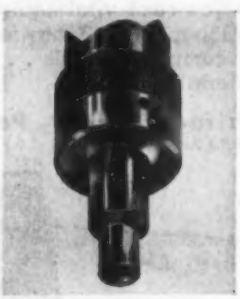
Special Model 202 Chuck used in Hand Drills in Aircraft Industry. 01 Models are regularly recommended for Hand and Air Drills.



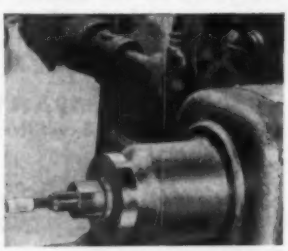
Vertical Milling operation with 101 Chuck.



Model 301 Chuck adapted to quick change production operation on upper spingle. Note self-contained, interchangeable drill bushings in special nose piece on lower chuck.



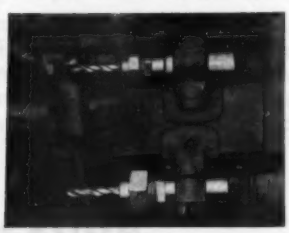
Model 201 High Speed Router Chuck with extend nose piece for pattern following.



Model 301 Chuck designed for high speed internal grinding operations.

SEND FOR BULLETIN "E"

Model 102 Chuck—adapted for standard floating holder operations.



Models 102 and 402 Chucks in use on Automatic Screw Machine.

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CINCINNATI BICKFORD SUPER SERVICE RADIAL

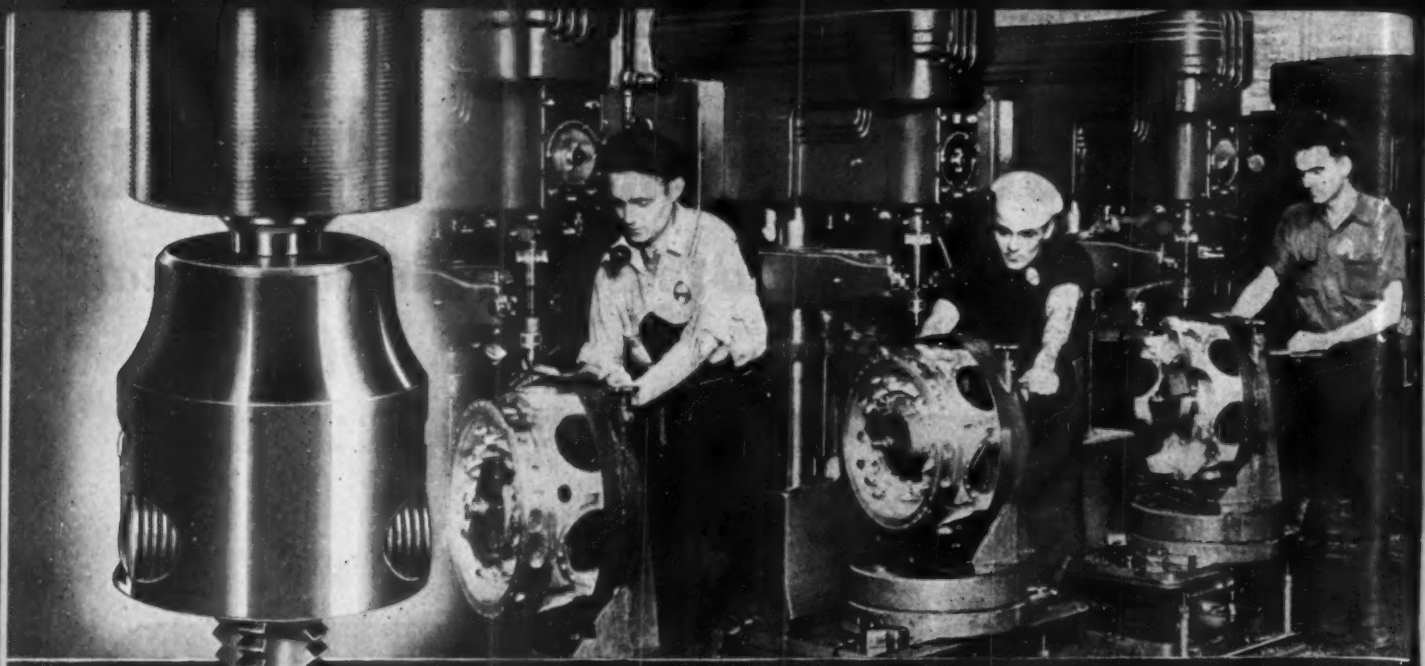
is the most accurate and easily handled Radial Drill we ever used . . .

—A STATEMENT BY THE
BELL AIRCRAFT CORPORATION
BUFFALO, N. Y.

The above statement by the Bell Aircraft Corporation refers to countless advantages derived from the Super Service Radial. In this important War Plant the Radial illustrated is used primarily for jobs on tools and fixtures where accuracy, speed and ease of handling are advantages of extreme value. Applied to many such operations—and more generally to quantity production—the numerous Cincinnati Bickford Super Service Radials in service today are proving their value as one of America's leading Tools for Victory. Bulletin R-21B lists all features and gives complete details.

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY · CINCINNATI · OHIO · U. S. A.



Give Your Taps a Real Chance to Cut PRECISION THREADS

STRICT Army and Navy specifications for Class 3, 4, and 5 gage fits call for the utmost in thread accuracy when producing war equipment. On top of this comes the demand for high output. The result in many plants is a costly percentage of rejects, loss of time and critical materials, and an epidemic of broken taps.

Hand threading is too slow, and variance of hand pressure impairs accuracy. Machine tapping with a lead screw guided through a solid nut also has its shortcomings—a loose worn nut causing backlash—a tight nut causing distorted threads.

On a Warner & Swasey Precision Tapping and Threading Machine the tap is free to do its specific job—cut threads.

A patented lead screw and solenoid actuated guide fingers completely control accuracy through entire tap travel, taking load pressures off the tap. A sensitive clutch automatically releases to prevent tool breakage if the tap becomes dull or strikes chips jammed in a blind hole. With this new lead screw principle, taps are saved, rejects reduced, and less operating time is used because extreme accuracy can be obtained with a single pass.

Send for a catalog describing four models of Warner & Swasey Precision Tapping and Threading Machines, for light and heavy duty jobs, in threading capacities from 0-80 to 1½". Ask your Warner & Swasey representative or write

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS ...WITH A WARNER & SWASEY

WARNER & SWASEY Cleveland

TURRET LATHES, SADDLE AND RAM TYPES • CHUCKING AND BAR TOOLS • PRECISION TAPPING AND THREADING MACHINES

Still Room for Improvement

THE WAR PRODUCTION BOARD tells us that it now takes one percent less labor to produce one billion dollars worth of munitions than it did a few months ago.

"All aircraft plants have found that their personnel requirements have gone down," reports the West Coast Aircraft War Production Council.

It attributes the improvement to better labor utilization, better production planning and the development by workers themselves into more highly effective production teams.

This represents progress, but he would be a bold man indeed who would argue that we have gone as far as we can in making proper and skillful use of our available labor supply.

The tendency to hoard labor is less than it was, partly because industry is cooperative and partly because war production officials are taking decisive action to stop it.

In a notable case, a manufacturer was denied a request for 13,000 additional workers and was asked to meet his expanding schedules with the 36,000 people already on his payroll. He did.

Similar cases could be cited. The Truman Committee has advocated the removal and disciplining of officers representing procurement agencies in war plants, particularly in critical labor areas, who fail to observe and report inefficiencies in employing workers.

It is hardly news to say that the output of individual plants making an identical product varies sharply so far as production per manhour is concerned. One plant is far ahead of another. In most instances this variance signifies good versus poor management. But the fact that it exists is a challenge in itself to make a better record. It demonstrates that plenty of labor slack can yet be taken up.

And what about the cooperation of labor? Unions have made moves in the direction of breaking down inter-union rules and doing away with "feather-bedding," but surely the ultimate has not been attained.

Wherever these union practices have been modified, at least for the duration, they have resulted in increased production.

And what of the plant workers themselves? Any experienced management executive will testify that much of the success or failure of a factory to meet its quota depends upon the willingness and eagerness of the men to do the job at hand.

If the morale is good and the men are in the spirit of the war effort, half of the production battle is won. Let's not overlook the fact that a good share of the responsibility for their morale rests upon management. In the case of plants with unions, labor leaders can help or hinder.

Other factors too numerous to mention, such as absenteeism, up-to-date manufacturing machinery, proper design of the product and the quality of available labor, have a bearing on raising the productivity of labor in American war industries today.

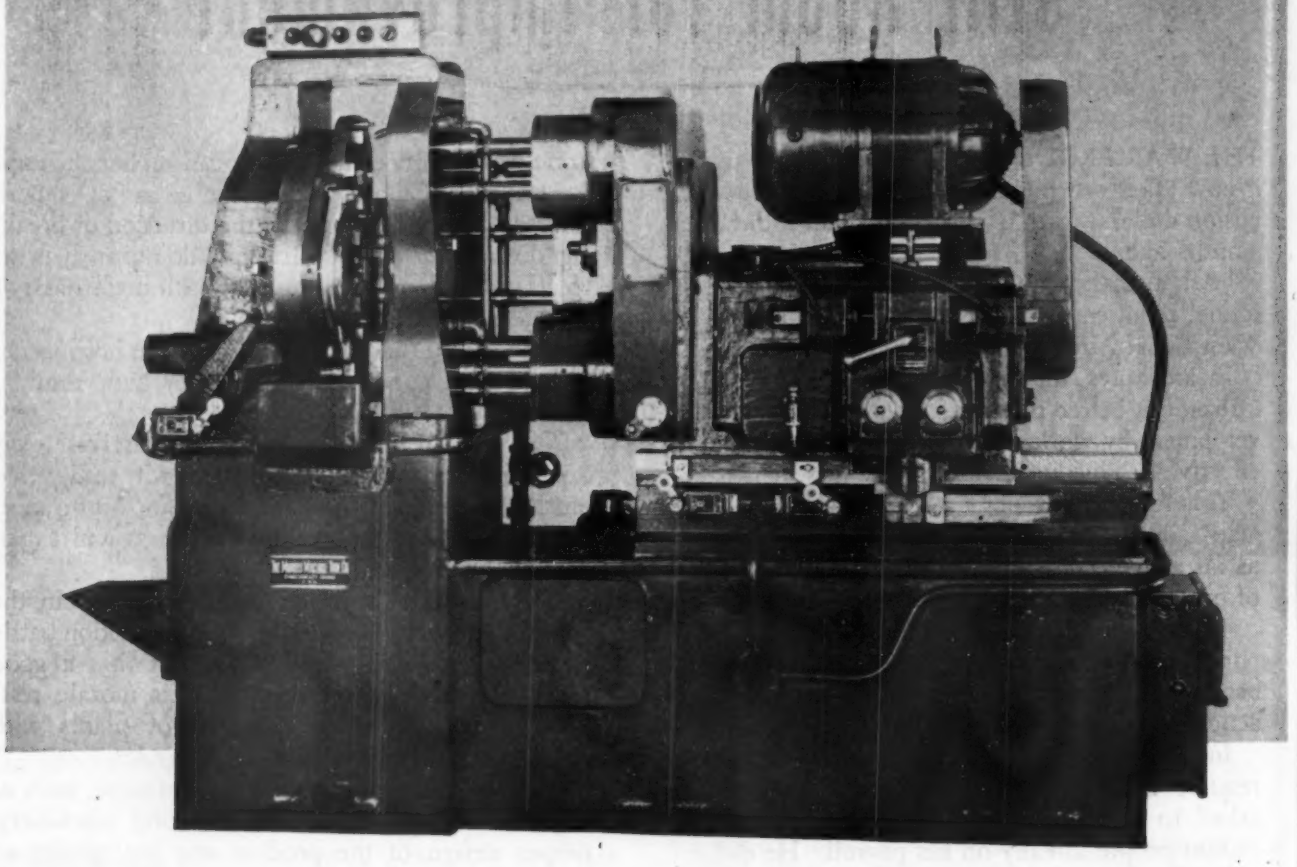
The main point is that the growing tightness of the labor supply imposes upon management the necessity for getting the last possible ounce of efficiency out of present operations.

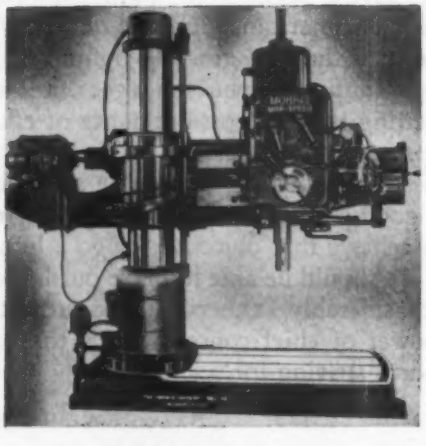
Under today's conditions, we cannot be satisfied to do merely a good job. We must do a superlative job. If we can achieve that objective, or go a long way toward it, we should be able to make our labor force stretch considerably farther than at present.

With manpower of chief concern today, that is an objective worth striving for.

Burnham Finney

MORRIS HORIZONTAL ONE WAY MACHINE





● Here is a typical example of Morris Engineering ingenuity and manufacturing skill in developing a specialized machine for high production and low costs.

This horizontal one way drilling machine was designed for drilling—countersinking—and reaming pump on cam and suction pump drive supports. It has 5 H.P. hydraulic feed units, a 14 spindle head, a 4 station hand index, and 4 hand clamp fixtures for holding the work.

Thinking today of the tasks of tomorrow it will pay you to consult Morris on special equipment designed for a specific job. They have both the engineering experience and organization to help you.

Builders of MOR-SPEED Radials

The MORRIS Machine Tool Co.

CINCINNATI, OHIO

Finishing

IT WILL BE a bright new world—postwar—as far as finishes are concerned. Mr. Consumer is fed up with the drab colors of war and the finishes supplied on many wartime civilian goods. He will want attractive products that retain their fine appearance for many years. To satisfy demands, tomorrow's finishing of metal goods will be vastly superior to that of five years ago.

Fortunately, many industries have an entirely new conception of metal-finishing through their experiences in producing war products. While Uncle Sam did not ask for the bright colors and lustrous surfaces civilian customers will want, he did insist upon finishes that will last and really protect the surfaces they cover. Lessons learned to satisfy these requirements are sure to guide future production plans.

It is hard to conceive of any product that will escape effects of the undercurrent of demand for the best finish available. Products that were once brightly plated are now eaten with rust; painted surfaces are likewise beyond redemption. Even such an insignificant and inexpensive item as the common pin is likely to be protected by a better and more permanent surface treatment.

Much of the improvement in metal-finishing will be unapparent to the inexperienced eye, as it will start from the first cleaning operation. However, there are a few developments which will certainly add eye- and sales-appeal to many products. Among these are the chemical finishing of many parts never before treated in any way; plating on plastics and other non-metallic materials; bright plating with lead, tin and zinc; organic finishes that will last way beyond present expectations and the use of porcelain enamel on many products which never had the benefit of such a finish.

As with most processes once relegated to an obscure portion of the plant, practically all of the metal-finishing operations are now being placed in production lines. As labor costs continue to rise, production men will continue their battle against needless material handling. Because it is placed in the production line does not mean, necessarily, that all equipment will be automatic, although much of it will be. It has been found that equipment no more complex than a simple dipping tank can be used advantageously in any production set-up.

War has brought to the fore the importance of better control over all metal-finishing operations. Controls will be of increasing significance when

METAL-WORKING TOMORROW

—the second of a series. Postwar production will benefit by war development. How finishing will be affected is told here

costs are again of paramount importance. In cleaning—time, temperature, and cleaning-solution concentration will be closely governed; in plating—electric current, thickness of deposit, time and solution will be carefully watched, and in organic finishing — solvents, solvent concentration, drying and film thickness will be highly controlled.

Working conditions will continue to improve around metal cleaning and finishing operations. Health and comfort giving features of the new plants will result in a demand for the same conditions in all plants. Relocating finishing equipment will give continued impetus to this trend.

Metal-finishing has gone far beyond the production plant. Many metal suppliers are now furnishing sheet stock that has been bright-finished, prepared for organic finishing, rust-proofed or plated. These finishes are such that they will stand reasonable forming operations without losing their important characteristics, thus making it unnecessary for the fabricator to do much, if any, finishing, or at least finishing preliminary to the final surfacing.

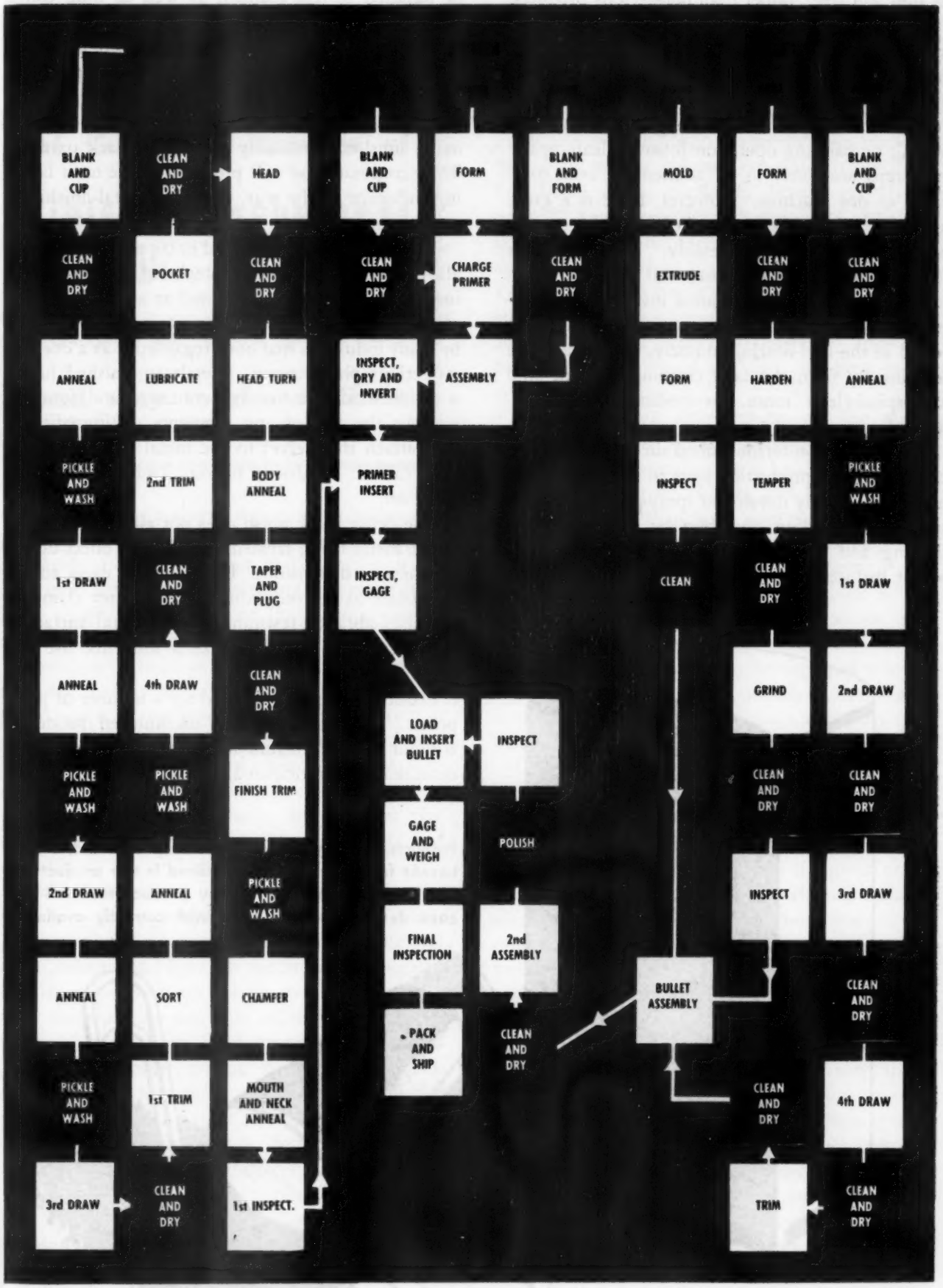
Gone will be the feeling, in the plant of tomorrow, that one cleaning method is satisfactory for all work. Practically as much study will go into determination of the proper cleaning method as will be given any other production problem. Each metal being cleaned, each substance being removed and each process to follow has a decided bearing upon the type of cleaning employed and method of application. Increasing use of zinc, aluminum, copper and magnesium makes it impossible and impractical to apply one cleaning method to all production. Varying demands will result in many smaller units of automatic equipment that fit production requirements, rather than a few huge cleaning installations.

Electro-cleaning has long been considered, by many, as the only way to obtain a chemically clean surface, so essential to the success of electro-plating and porcelain enameling. Despite this, there has been some resistance to its use because of danger and unpleasant working conditions created by hydrogen that is released by the process. Hydrogen bubbles, of large size, foamed on the surface of processing tanks and, if extreme care was not taken, there was danger of explosion. Recently developed methods and salts result in a shallow, dense foam blanket that stays within definite limits. Such control eliminates danger of overflowing, fuming and explosion. In many cases, anodic cleaning eliminates a precleaning operation, but many plants will continue to use a preliminary degreasing, tumbling or washing operation before electro-cleaning.

Essentially the same equipment and methods are used in an electro-chemical descaling process. Electro-chemical descaling will be the most important descaling method in tomorrow's plant, especially where there must be no dimensional change such as on precision threaded pieces, molds, dies and gears. An advantage of the method is in its ability to completely remove scale from recessed parts. A protective metal coating deposited on the surface being descaled prevents pitting and etching as well as dissolution of base metal. For parts that are to be stored indoors, or that will be subjected to very slight corrosive action, no further surface treatment is required.

Degreasing is being used more frequently as an intermediate cleaning operation. During the war many companies started using degreasing between most production operations to remove minute oil-bound metallic and abrasive particles that possibly could damage dies and tools used later. In many instances a reasonably clean surface is desirable but a fine film of oil should be retained. This can be done. Solvent degreasing is expected to find an increased use in all types of operations since there are available non-flammable, chlorinated solvents that can be used in three basic degreasing systems —vapor, spray and immersion.

In some cases, special cleaning powders will be employed to provide a triple effect upon the metal being cleaned—degreasing, coating for better adhesion of organic finishes and forming a rust-resistant finish. This type of powder is most suitable for pressure washing machines, and for use



Cleaning is used increasingly, both prior to subsequent finishing operations and between manufacturing processes. This chart, for brass shells, serves to illustrate how many cleaning operations are used on a comparatively simple job. This has helped force cleaning equipment into production lines along with other finishing processes

on iron and steel, rather than non-ferrous products.

Industry has learned that carelessness after cleaning can be as bad or worse than improper cleaning. Excessive handling, mechanical or otherwise, gives opportunity for additional dirt to attach itself and void effects of previous cleaning. When a final plating or painting operation follows cleaning the two steps are likely to be adjacent or even combined in one machine. However, there is a great need for protecting parts where cleaning is the final operation before assembly. This need calls for additional protection and will result in more carefully arranged and cleaned inspection and assembly rooms. Typical is the type of assembly room found in the ball-bearing industry, where parts are fed directly from the final cleaning machine into a hospital-clean room, air-conditioned and air-filtered.

Pickling of non-ferrous metal sheets will be done continuously in production lines in the plant of the future. A recently developed spray-pickling process speeds the pickling operation by eliminating the dipping and removal of sheets and results in a bright surface finish. Sheets 15 to 20 ft. long may be handled in this manner, as well as long continuous sheets.

Shortages of plating materials, caused by war, led to a search for new processes in giving corrosion-resistant finishes to metal parts. The search led to development and extended use of chemical-oxide finishes, commonly known as black oxides. Their continued use will probably be the most lasting influence of the war, as far as metal-finishing is concerned.

Black-oxides can be applied to copper and copper alloys, zinc and zinc alloys, steel and tin by simple, inexpensive methods. First used as a substitute for plating and painting, it will be retained as a process by many industries that once regarded it as a deeply mysterious phenomenon. Metals so finished have a jet-black surface that is permanent and formed without the use of any pigments or ingredients that attach themselves to the metal, thus the surface cannot be dried, broken away, melted or worn off.

The dense black finish does not alter the character of metal being treated so it has no effect upon hardness or dimensions. In fact, many users advocate black-oxides on sliding parts as they claim it increases abrasion-resistance of the metal surfaces. Its oil-carrying qualities make it ideal for use on parts that must be run in.

Oxide finishes may be used for a number of purposes. They may be used on finished products without further treatment. If excessive corrosive conditions are anticipated, the surface may be fur-

Products, ranging from the common pin upward, are to benefit from new knowledge gained in war production. It is hard to conceive of any product that will escape demands for the best finish currently available

More people are aware of the great number of finishing techniques available, where they should be used properly and why to choose them

ther protected by a simple wax coating, which also adds to the sheen of the product. Too, it supplies an excellent bond for paint or lacquer, with the additional advantage of preventing bare metal from being exposed in the event the organic film is scratched or otherwise destroyed.

This type of finish is so easily and economically provided that its continued use on products of all types is a foregone conclusion. It is definitely to stay, for industrial products and many consumer products so treated will find ready acceptance; consequently, many products will be wooed away from plating and organic finishing. Its use over zinc adds further protection to galvanized sheets and adds life to zinc and zinc-alloy die-castings.

Oxide finishes can be grouped in the class of immersion coatings which also include the phosphate coatings used primarily for rust-proofing and to provide a bond between the metal and organic finishes. One such phosphate coating includes a stain that increases corrosion resistance of the surface and adds to its lubricant-carrying qualities. Another immersion coating is the hot-dip lead-coating that is now being used rather widely for protecting many parts that were once tin- or zinc-coated. Lead-coating gives better atmospheric protection than galvanizing and does not alloy with the iron or steel base. Postwar applications of lead-coating are expected to limit somewhat the quantities of products that will be galvanized.

The value of porcelain enamel as a finish has been long realized for such products as refrigerators, stoves, advertising signs and chemical equipment, but its use is likely to be extended in the postwar era. It will be reconsidered for many products, since it has left the real of art and has become a true production process. As technical attention has been focused upon porcelain enameling, thickness of coating has been reduced materially, and chipping is no longer a serious problem. The latter is true because especially treated iron has been made available, better preparatory methods have been devised and parts are specifically designed to overcome its limitations and take advantage of its many superior qualities. As a weapon in the battle for eye-appeal, porcelain enamel is without a peer, when considering it abrasive-resistance, corrosion-resistance, resistance to thermal shock and the fast, life-long colors available.

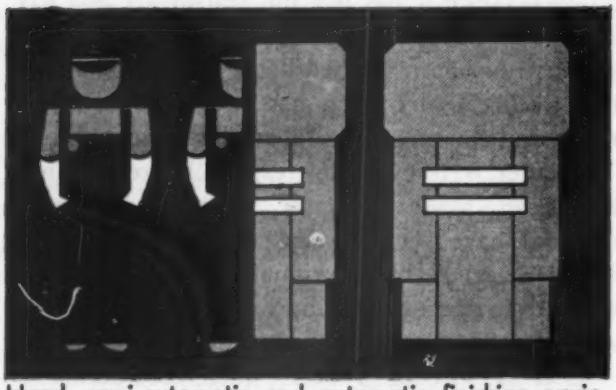
Of more recent development are the alkali-alumina series of silicate coatings, which differ from porcelain enamels. These finishes are applied by light spraying or dipping and then baked on the metal, rather than fused with it. Such coatings can have a dull or gloss-finish, as desired. They are corrosion-resistant, partially acid-resistant and heat-resistant up to temperatures of about 800 F. As they are easy to apply, they can be used on many types of hardware and plumbing fixtures and will probably find application on heating and ventilating equipment, pipes, tanks, industrial ovens, agricultural equipment, contracting machinery and some railroad equipment.

Other silicate coatings include high-firing porcelain enamels, subjected to fusing temperatures between 1,650 and 1,800 F. These give superior corrosion-resistance under highly unfavorable conditions and will be used on such things as smoke stacks, engine exhaust pipes and chemical processing equipment. Colors can be obtained. A silicate paint that is fire-resistant has been developed for spray application. It serves well on parts that are subject to continuous or intermittent high temperatures.

War has accelerated appreciation for the protective value of electro-plating. This new appreciation has forced perfection of plating processes and widened the scope of its use. Shortages of materials such as chromium, nickel and cadmium fostered increased use of other corrosion-resistant materials including zinc and lead and the development of special anodes which result in metallic depositions as satisfactory or better than the materials for which they were substituted.

Generally speaking, there will be more automatic plating and more bright plating, both intended to reduce handling and finishing costs.

HAND, SEMI-AUTOMATIC OR AUTOMATIC?



Hand, semi-automatic and automatic finishing equipment can be used equally well in production set-ups, depending on parts, processes and quantities involved

While most automatic plating equipment will be special-built for large scale production, at least one company has the intention of making available a small automatic machine for universal use.

Plating has emerged from an art that was practiced strictly by rule of thumb and submerged in a welter of deep, dark secrets. Tightening of specifications has made industry realize the need for complete control over all phases of plating. In the past, specifications have called for an average thickness of plating. In the future, specifications will demand a minimum thickness.

Naval requirements have given impetus to the use of oil-bearing chromium plating on wearing surfaces of internal combustion engines, especially cylinder barrels for diesel engines. Control over the plating process results in a deposition containing small pockets, of regular size and shape, which hold lubricating oil. Increased working life of the parts so treated, indicates that the process will be widely used in manufacturing engines for commercial vehicles and other equipment subjected to rough usage and where there is a definite commercial advantage in keeping units in service for maximum periods between overhauls.

Electro-plating has also emerged as more than just a means of providing protective and decorative finishes to metal products. It has now taken its place as a productive operation, especially in connection with reclamation of cutting tools and in deep-drawing of steel.

Chrome plating of cutting tools was far from new, even at the outbreak of war, but a new realization of the value of such treatment came when cutting tools appeared on critical lists and salvage became the order of the day. There will be continued use of chrome plating for this purpose after the war, not only because it adds to tool life, but because it will be economically unsound to fail to take advantage of its possibilities. This will be especially true in the case of expensive form tools and broaches, where two or three replating operations can extend tool life many times. Besides renewing tool life, chrome plating serves as a lubricant between tool and work, stopping the formation of built-up edges.

It is doubtful if steel could have been used to the extent it was in the manufacture of cartridge and shell cases, if it had not been for the use of a special copper-plating process which resulted in a fine-grained, homogeneous deposit with extreme smoothness and excellent adherence. Density of deposit and its easy flow under forming, made this copper-plating especially suitable for deep-drawing steel. As steel was never drawn as deeply before, satisfactorily, the advent of cuprous-oxide copper plating opens limitless possibilities for deep-drawn steel parts in postwar production.

The same type of copper-plating is expected to have extensive use in the automotive industry as the basis for nickel and chrome plating of hardware. The smooth surface presented by the copper coating, is expected to result in a brighter nickel deposit, reducing the amount of polishing and buffing required to achieve a final bright chrome finish.

Zinc, the only commonly used metal giving anodic protection to steel, was adopted as a substitute for cadmium when that metal became scare. Processes for plating and subsequent treatment of zinc gave it corrosion-resistant qualities equal to cadmium. Many plants converted to zinc and the experience gained will enable them to use the cheaper and more readily available zinc on peacetime products and still receive the consumer acceptance formerly reserved for cadmium. An anodic treatment, which results in a black, yellow or transparent surface, can be applied to zinc die-castings or zinc-coated objects. This treatment protects the zinc itself by inhibiting the formation of white corrosion products. Immersion coloring processes are also being used to supply an attractive colored finish to zinc-coated materials.

With cadmium and zinc both earmarked for war little was left for essential civilian goods, so the plating industry turned to the only remaining metal —lead. Lead can be used for the protection of iron and steel against corrosion and in certain uses it is superior to other plating materials, if applied in sufficient thickness. Refinements in lead-plating has made its use safe, simple and sure.

As an example of development spurred by war

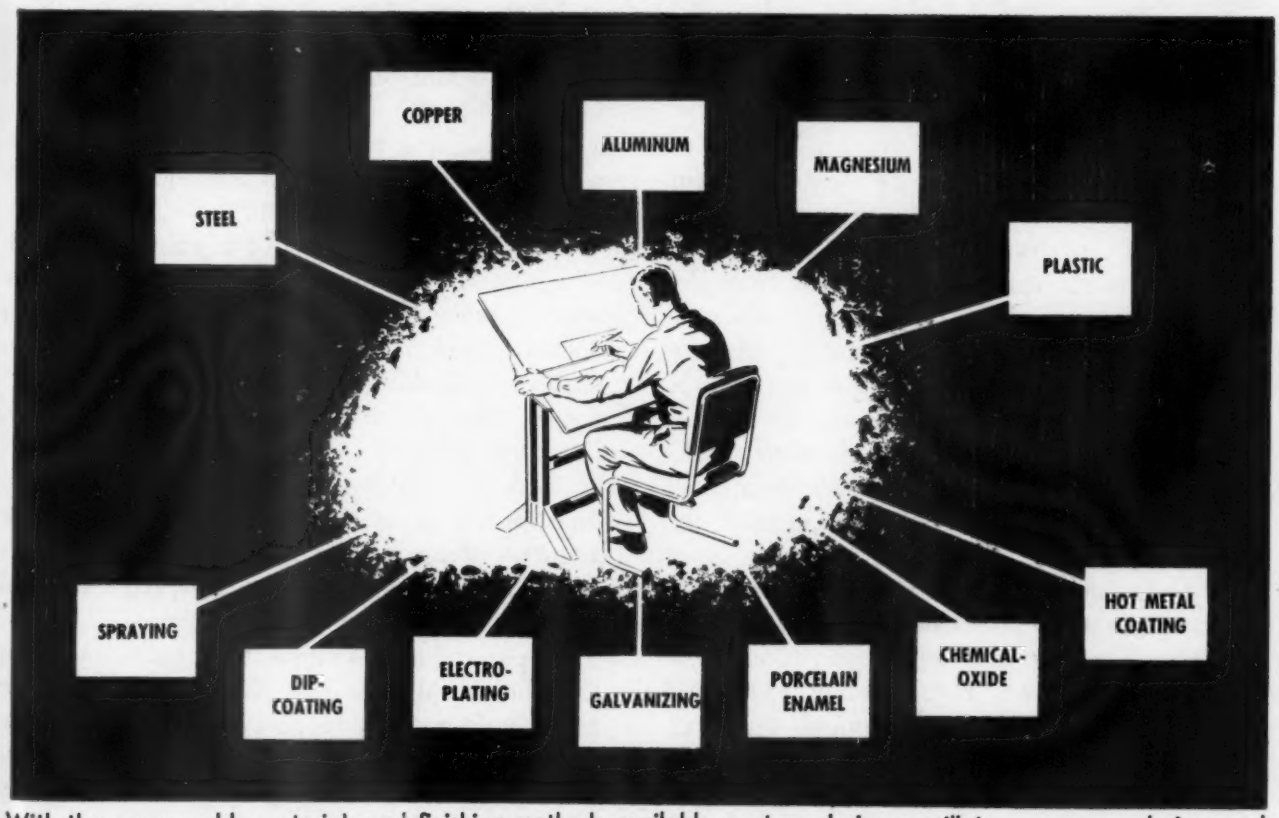
is a special plating anode made of an alloy of copper, zinc and tin for plating copper or brass parts of aircraft instruments that must carry high-frequency currents and also resist corrosion. Nickel could not be used because of its high electrical resistance and gold would have been satisfactory, except for its cost. Such an anode, where its special qualities are required, will probably find wide use post-war, as it is said to be superior to nickel in corrosion-resistance, provide a mirror-finish, highly resistant to abrasion, non-magnetic and easily soldered. There are probably many more developments of this kind that will remain buried until the war's veil of secrecy is lifted. These will offer additional choices for the manufacturer looking for exactly the right finish for his product.

Metal scarcities led to the Army's use of plastic buttons, which were plated to make them look as tradition demands they should. Similar plating has been done on other plastics, but adherence of the plating depended largely upon surface roughness of the plastic. Experimental work is being conducted in this field so that in the future we shall be able to plate on most plastics regardless of surface.

Vapors containing corrosive-resistant metals may be used in heat-treating furnaces to supply a thin coating to non-ferrous sheet materials. This is now being done experimentally on copper sheets. Zinc is vaporized in the furnace through which the sheet passes for annealing. When the annealing cycle is completed, the sheet emerges with a beautiful brass finish. Attempts are being made to vaporize nickel, chrome, lead and other metals so they will combine at high temperatures with the base metals. Though it is too early to tell now, this process, or a variation, may revolutionize the protective-finishing of a wide variety of parts and combine this operation with annealing.

In the field of organic finishes, changes have been subtle, rather than spectacular, with one major exception. It is this exception that will foster much of the future development in metal-finishing. Brand new is the application of high-voltage electricity to the coating of materials with paint, lacquer or enamel.

The first electro-static application came in detearing pieces painted by dipping or flow-coating. Fatty edges, or "tears," form on edges of such pieces when surplus paint flows down the surface. Tears created quite a production problem, as they must be removed if a smooth surface is to result. Formerly they were removed by hand and then the points where they had been were touched up before



With the many usable materials and finishing methods available, postwar designers will, in many cases, design products to take advantage of specific finishes and will choose finishes more carefully to protect the product properly

As an example of how greatly the use of phosphate rust-proofing materials has grown, observe this sales chart of just one company manufacturing such materials

the piece could be packed or shipped. Now, as parts travel on a conveyor, between the point where paint is applied and the baking oven they pass through an electro-static field. This electro-static field forces tears to be repelled from the work before they set and leaves a smooth even edge that needs no further treatment. Fields may be varied for different drying speeds and degrees of viscosity of the finish.

Success with the detearing process led to the development of an electro-static process to be applied in automatic paint-spraying. By this method, the object to be coated attracts charged particles of paint or lacquer in such a way as to cause the surface of the object to be completely covered with a smooth, even coat. Not all types of objects may be sprayed this way, as protruding edges and recesses are difficult to coat uniformily. However, where applicable, the method is said to result in highly uniform paint films and great economy of material. Savings up to 40 percent in organic finishes are said to be possible by this method.

Either of these electro-static methods can be used on wood, rubber, earthenware as well as steel.

As to organic finishes themselves, changes will be in the nature of refinement in formulation with faster drying speeds and greater flexibility of surface as the goals. It is natural that manufacturers returning to peacetime production will take advantage of the lessons in finishes taught by the war. This war is tough on finishes and is furnishing data that will enable paint manufacturers to answer practically any question about the durability of any finish.

Lacquers may be replaced in some industrial applications by new synthetics which are prepared with better and richer solvents. Lacquers are used now because of their speed of drying, but in some instances they give a poor finish because of shrinkage and lack of adhesion to the coated surface. Oil-base finishes are generally too slow. Synthetics have the best all-around qualities, except that they dry too slowly for high production industries.

One recent development in synthetics, which has not yet been made publicly available, is expected to result in enormous savings in material cost; speed drying time and reduce overall application time by at least one-half. In experimenting, one plant's finishing expert found that, properly prepared, a synthetic air-dried in 11 sec. as compared to 14 sec. for lacquer; cost $1.75 per gal. less; allowed better control of film thickness; was fireproof and could completely and smoothly cover a surface with two coats. The same surface formerly required a primer, two coats of lacquer, a water-sanding operation and then two more coats of lacquer for the final finish.

Little has been said up to this point about tumbling, polishing, rust-proofing and some of the other standby operations of metal-finishing. This does not mean that these processes have been stagnant or have lost value in the over-all picture. Rather, their progress has been slow and steady, instead of fast and spectacular. They will always be used, their value undiminished. They, like all other phases of metal-finishing, have come to the attention of many more manufacturing executives and will be chosen with proper perspective in planning tomorrow's metal-working plant.

Despite the more easily singled out advances in the whole field of metal-finishing one underlying fact stands out. More people are aware of the great number of finishing techniques available, where they should be used properly and why. This knowledge will serve them in good stead in tomorrow's competitive battles.

Centralized Soluble-Oil System Pays for Itself in Two Months

COMPLAINTS of parts rusting in process have disappeared since the installation of a centralized mixing and pumping station for soluble oil at the John Inglis Company, Ltd., Toronto. Formerly operators might use a mixture as high as 70:1 at their own discretion. Now, one standardized mixture—20:1—is pumped to all manufacturing departments, and no one is permitted to water it down.

Use of this ratio has proved satisfactory on all jobs requiring soluble oil; much wear on cutters and tools has also been saved. Less maintenance labor is required. Each man servicing machines with soluble oil is now able to handle a larger area, since he is no longer required to perform the mixing operation. Taps are placed in supply piping at every bay or bay and one-half for convenient filling of containers.

Mixing and pumping equipment for soluble oil is installed in the "pump house," which has the principal function of clarifying cutting oil and returning it to the gun-barrel rifling department under high pressure. One man per shift normally looks after the pump house; now operates the soluble-oil mixing and pumping equipment as well.

Three tanks are compactly arranged for mixing and distributing the soluble oil. At the center there is a 175-gal. tank where hot water is sprayed on the oil concentrate, and compressed air is forced through the paste-like mass to achieve thorough mixing. After a couple hours of aerating the concentrate is pumped into one of two 600-gal. tanks. Here cold water is added to the concentrate until the 20:1 ratio is secured. The other tank is used meanwhile to supply the plant.

Cutting oil is pumped through manufacturing departments in the same way, taps being located adjacent to the soluble oil taps. A make-up tank in the pump house allows the attendant to add new oil, or reclaimed oil.

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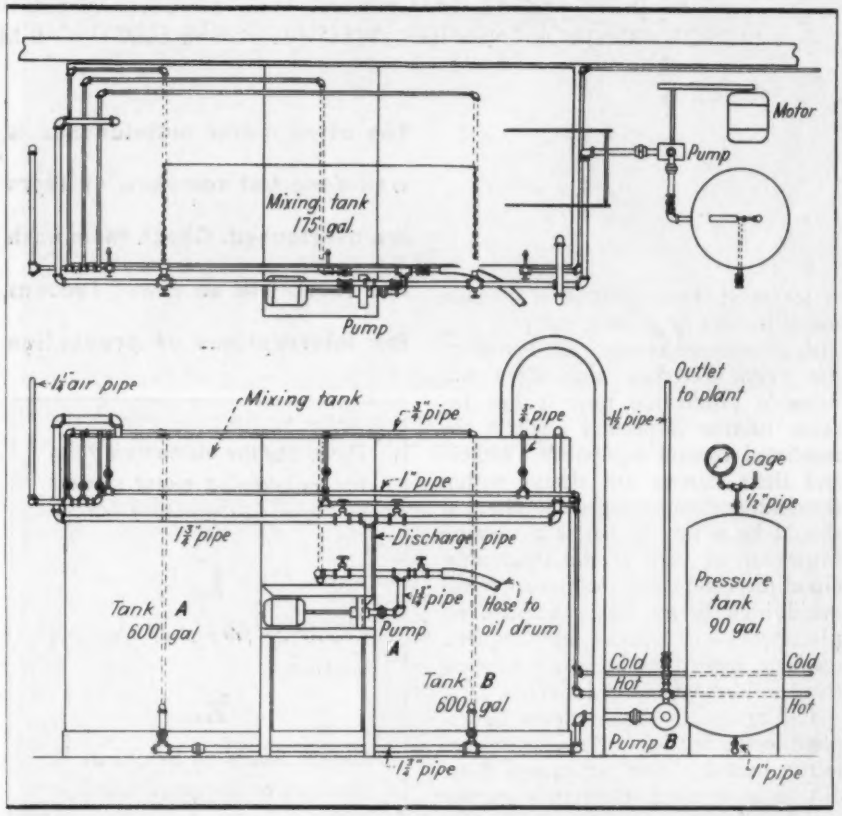
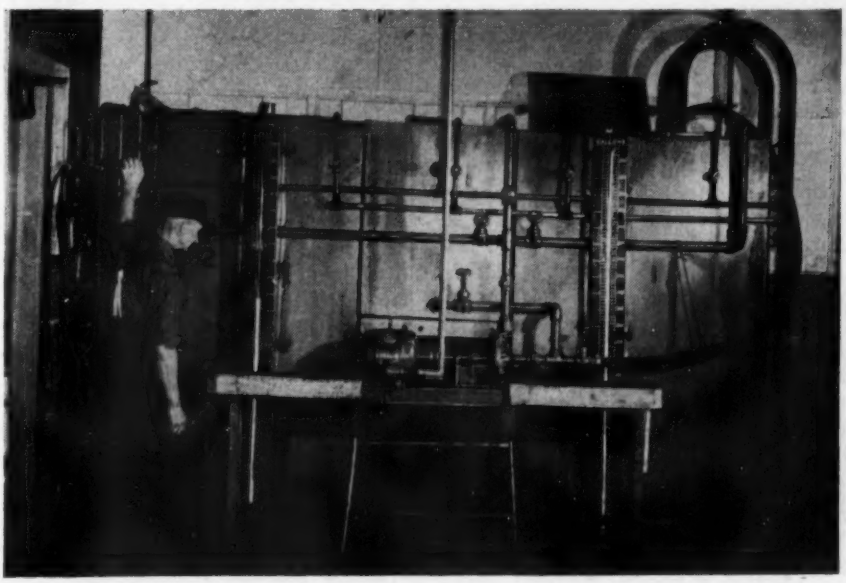
Installation cost of the centralized soluble-oil mixing and pumping equipment was $700; in reduction of maintenance labor alone, this sum was saved in two months



Pump A sucks concentrate from a drum, discharges into the 175-gal. mixing tank. After mixing with hot water and aeration, the pasty mixture is transferred by the same pump to either tank A or tank B, whichever happens to be empty. Here cold water is added to reduce the mixture to a 20:1 ratio. Pump B draws from one tank at a time, feeds shop lines at 60-lb. pressure



Follow Six Simple Rules And Save Motor Starters

BY D. W. McGILL, MACHINERY ELECTRIFICATION SECTION AND L. E. MARKLE
MOTOR CONTROL ENGINEER, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Too often motor maintenance is well done but somehow starters are overlooked. Check them both and there will be fewer reasons for interruptions of production

A MACHINE TOOL MOTOR is of little use if it can't be started, stopped, jogged, or reversed as required. Too often the motor becomes inoperative and valuable production time is lost because routine inspection neglects the associated control equipment. Motors and their starters are always within reasonable distance of each other; it should be a simple matter to require inspection of both at the same time. Good inspection and maintenance will avoid high repair bills, complete replacements will become less frequent, machine down time by reason of electrical failures will be reduced.

Oil or grease should never be applied to the bearings of a relay or contactor because these substances cause dirt to accumulate, forming a gummy deposit that gives rise to sluggish action of the mechanism. Bearings in these devices are designed with service conditions in mind, and no lubrication is required.

Inspection Intervals

Movable elements of contactors or relays should operate freely and without apparent friction. If parts are out of alignment and excessive friction exists, the condition should be eliminated by adjustment. Sluggish action of the device will cause electrical troubles. Inspection should be made once a month in the case of severe service; once every six months for average service, to prevent or minimize bearing and friction troubles.

No bearings are required when the moving parts of a contactor or relay are relatively light. In this case the magnetic forces can be made strong enough to lift the moving parts to close the contacts. So far as bearings are concerned, this is the ideal design. But the moving parts must be guided within the solenoid, and non-magnetic guides must be furnished to prevent magnetic sticking and sluggish action.

Contacts should be replaced when badly pitted or worn thin. The mechanical duty to which contacts are subjected is just as important as the electrical load. Realizing this, the manufacturers subject equipment to endurance tests, with no current flowing, to observe how well the contacts withstand pounding, rolling and sliding, or scrubbing action that occurs at closure. Contactor designs often provide a rolling action of the contacts so that the circuit is closed and opened on the contact tips instead of on the closed contact position.

Keep Arc Boxes in Place

Powerful arc-rupturing structures are supplied to force the arc off the contacts and quickly extinguish it when high currents are expected. These structures are called arc boxes or blow-out structures. In operating position they surround the contacts and of course must be in the correct position to rupture the arc effectively. Easily removed for inspection or replacement of contacts, the arc boxes must be returned to the proper position so that the arc will be broken correctly and the contacts will not be burned or worn.

Contacts should be kept clean but they need not be smooth. In fact, a clean but roughened surface is better than a clean smooth one. If a contact surface is pitted or burned but not too thin, it can be cleaned and re-used.

The method of cleaning is important. Filing wastes metal, generally deforms the shape. Contact surfaces then have high spots that are likely to overheat. Cleaning with sandpaper or a buffing wheel will give satisfactory results. Emery paper should never be used because particles of abrasive may adhere to the surface and cause premature wear.

Silver contacts seldom require clean-

These are the elementary rules for maintaining motor starters in good operating condition:

1.

Keep them free of oil, dirt and moisture.

2.

Do not apply oil or grease to contacts or bearings found in relays or contactors.

3.

Connections should be tight and the wiring safe.

4.

Movable parts of contactors and relays should move freely and without friction.

5.

Contacts should be kept clean and tight and made to operate at correct pressure. They should be replaced when worn too thin.

6.

Arc-rupturing devices must be in the operating position.

ing. They may look dirty because of oxide coating, but this is a conductor and hence cleaning is not often necessary.

When contacts are replaced, the bolting surface should be cleaned thoroughly because this is usually a current-carrying joint. Obviously a clean part fastened to a dirty surface will not give best results. Any trace of copper oxide should be removed.

Screws or bolts that hold contacts in place should be tight. A loose contact surface offers high resistance and develops heat. As copper oxide is not a good electrical conductor, more resistance and heat are generated. The action is cumulative and eventually causes the contacts to melt plus deterioration of the entire assembly.

With fairly frequent operation, contacts are kept bright and clean by the rolling and rubbing action combined with the slight burning of a normal arc. If the contacts do not operate frequently, the cleansing action does not occur and a coating of copper oxide develops. A heating-oxidation cycle may then start even though the current is normal. For such conditions silver contacts will probably give the best service. They also provide some relief where a small overload is troublesome. Caution in their use is indicated because they will not cope with overheating caused by loose connections. Silver has a lower melting point than copper; hence silver contacts are more likely to become soft and weld or freeze together when subjected to high arcing temperatures.

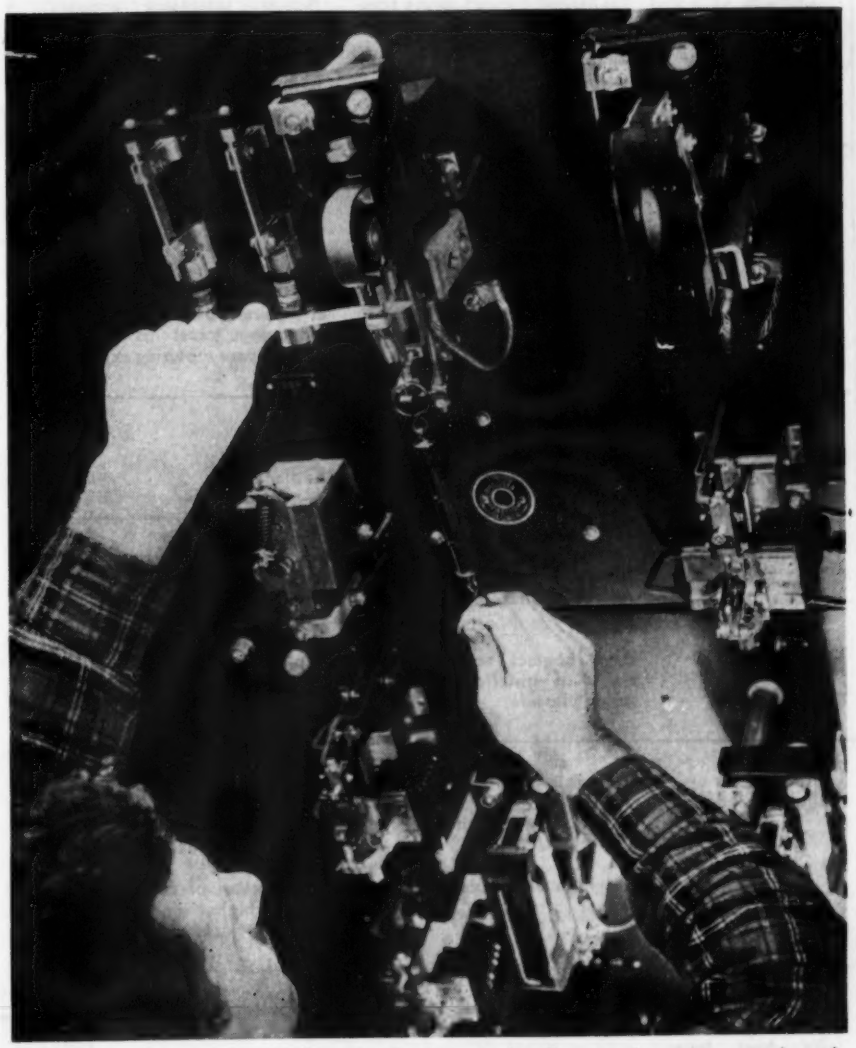
Reasonably good service under unusual conditions can be obtained from special-alloy contact materials. But they should be used only with the advice of the manufacturer of the electrical device. Usually such contacts are rated at lower current-carrying capacities than similar contacts of copper or silver.

Replace Worn Contacts

The pressure of contacts when closed determines their current carrying characteristics. A small contact with suitable contact pressure will carry more current than a larger one closed under little or no pressure. Renewal of thin contacts is required because they lose contact pressure with wear. Contact springs must also be kept in good condition. Replace them if they have been damaged or have lost temper through exposure to high arcing temperatures.

A monthly inspection of contacts for pressure, available life, surface condition, temperature and tightness should suffice under normal conditions. Weekly inspection is advisable for severe operating conditions.

Loose connections are an elusive cause of operating troubles. Tighten them according to a planned schedule



Contact pressures should be checked periodically, weak springs replaced, thin contacts renewed, burned or pitted contacts sanded or buffed

CHECK CHART FOR MOTOR-STARTER TROUBLE

TROUBLE	CAUSE	WHAT TO DO
Contactor or relay does not close.	No supply voltage.	Check fuses and disconnect switch.
	Low voltage.	Check power supply. Wire size may be too small.
	Open-circuited coil.	Replace.
	Pushbutton contacts not making	Clean and replace if badly worn.
	Interlock or relay contact not making.	Adjust and replace if badly worn.
	Loose connection or broken wire.	Check circuit with "flash light" (turn off power first!)
	Overload-relay contact open.	Reset.
Contactor or relay does not open.	Pushbutton not connected correctly.	Check connections with wiring diagram.
	Shim in magnetic circuit* worn allowing residual magnetism to hold armature closed.	Replace.
	Interlock or relay contact not opening circuit.	Adjust contact travel.
	"Sneak" circuit.	Check control wiring for insulation failure.
	Contacts weld shut.	See "Contacts Weld Shut."
Contacts weld shut	Insufficient contact spring pressure causing contacts to burn and draw arc on closing.	Adjust, increasing pressure. Replace if necessary.
	Rough contact surface causing current to be carried by too small an area.	Smooth surface and replace if badly worn.
Arc lingers across contacts.	If blow out is serious, starter may be shorted.	Look at wiring diagram and see kind of blow out. Check to see if circuit through blow out is all right.
	If blow out is a shunt, it may be open circuited.	
	If used, arc box might be left off or not in correct place.	See that arc box is on contactor as it should be.
	If no blow out used, note travel of contacts.	Increasing travel of contacts will increase rupturing capacity.
Noisy A.C. magnet.	Improper seating of the armature.	Adjust.
	Broken shading coil.	Replace.
Excessive corrosion of contacts	Chattering of contacts as a result of vibration outside the control cabinet.	Check control pressure and replace spring if it does not give rated pressure. If this does not help, move control, so that vibration is decreased.
	High contact resistance because of insufficient contact spring pressure.	Replace contact spring.
Abnormally short coil life.	High voltage.	Check supply voltage and rating of controller.
	Gap in magnetic circuit†.	Check travel of armature. Adjust so that magnetic circuit is completed.
	Too high an ambient temperature.	Check rating of contact. Get coil or higher ambient rating from manufacturer if necessary.
Panel and apparatus burned by heat from starting resistor.	Motor being started too frequently.	Use resistor of higher rating.

*D.C. only. †A.C. only.

Shunts should be renewed when frayed. These are generally flexible bands of woven wire that carry current from contacts to a stationary stud. Some of the strands will break from excessive flexure, causing additional load to be placed on the remaining ones. To prevent overheating, shunts with broken strands should be replaced. Terminal connections of the shunt should be tight.

Coils must operate at the rated voltage. A.c coils are designed to withstand 10 percent over-voltage, to operate the device at 85 percent of normal voltage. D.c coils will likewise withstand 10 percent over-voltage but will operate the device at 80 percent of normal voltage.

Over-voltage operates a contactor or relay with more than the rated force and tends to shorten the mechanical life. It also shortens the life of the coil by inducing a higher temperature. Low voltage on the other hand causes sluggish action. Contact tips may touch but not be forced completely closed by spring pressure, whereupon the contact tips overheat and may weld together.

On a.c. service the coil current is much higher while the contactor is closing than after it has closed. A.c. coils are not designed to withstand the open-gap or closing current continuously. If mechanical interference prevents complete closure of the magnetic air-gap of an a.c. device, its coil will soon be overheated.

Coils Easily Replaced

Open-circuited coils are easily detected because they can not operate device. A voltmeter connected across the coil terminals should show zero reading under these conditions. A coil with some turns short-circuited might operate, but it will soon overheat and burn out. Most contactors and relays permit quick and simple replacement of a defective coil.

When a magnetic contactor opens, the movable part strikes a stop rather forcibly. There is a "dead point, or center of percussion, at which the effect of the blow is nullified. If striking occurs at some other point the device is subjected to vibration and stress that reduce its mechanical life.

Excessive noise is an indication that all is not well within control apparatus. D.c. contactors operate quietly when closed. On the other hand, a.c. contactors may be noisy for a variety of reasons. The laminated magnetic structure necessary on a.c. designs must be held tightly together with screws or rivets. If laminations become loose the assembly will be noisy. Noise also results if the movable and stationary

pole pieces do not fit well when the device is closed. Dirt or rust may prevent proper closure of these elements. Grease is applied to such fitted surfaces, upon shipment, to prevent rust; the grease must be removed when the a.c. contactor is placed in service to eliminate a sticking or sealing effect.

The most important element for reducing noise in an a.c. device is the shading coil, which is usually embedded in part of the laminated magnetic structure. This coil is often a single coil of wire or a strap. If it is broken, the noise will be objectionable. So if a contactor is noisy, look first for a broken shading coil.

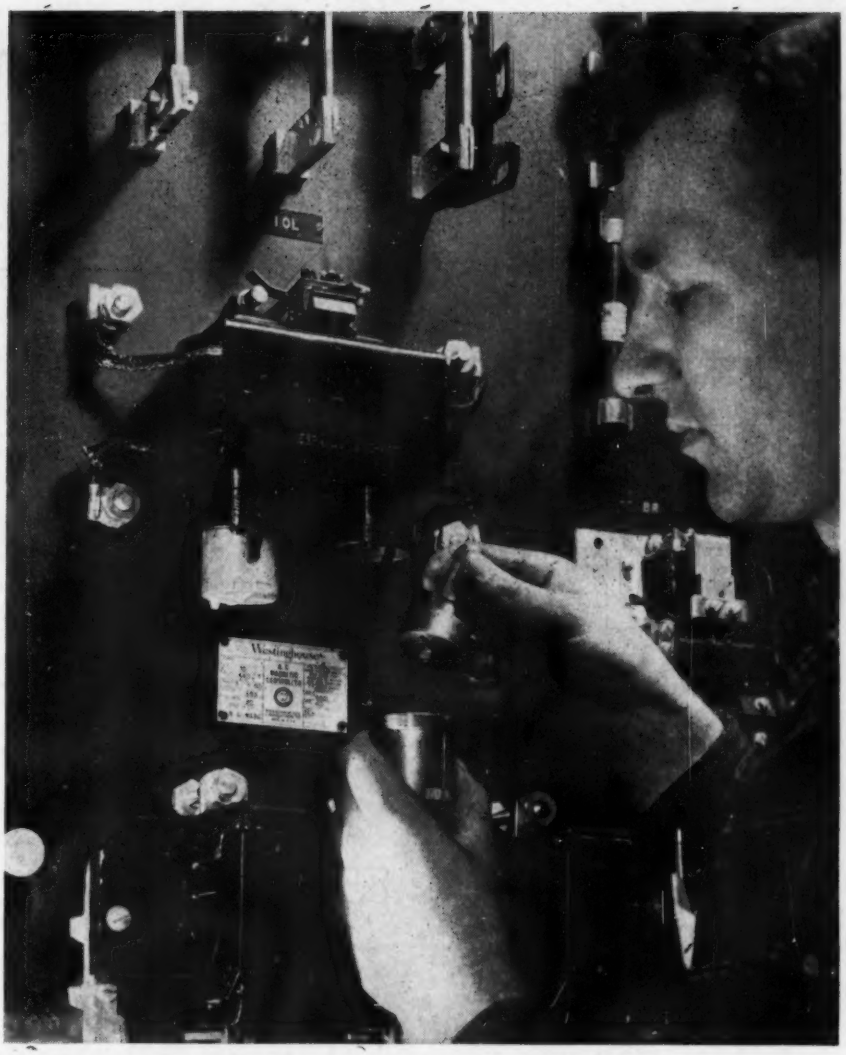
Relay operation is dependent upon the maintenance of the proper liquid level in dashpots, if oil or other liquid is used. No substitution of fluid should be made, because liquids used in dashpots are tested for certain characteristics, such as change in viscosity with change in temperature. Any change in dashpot fluid will affect the operation of the relay.

Thermal Heater Selection

Thermal relays are subject to ambient temperatures and should be located in a room temperature like that where the motor is situated. Otherwise, the relays may not operate to the best advantage. If a thermal-overload relay is placed in a room where the temperature is much in excess of the motor-room temperature, proper allowance for the temperature differential should be made when the thermal heaters are selected.

Loose connections are a frequent cause of trouble in motor control apparatus. They result in overheated parts that must eventually be replaced. Once tight does not mean that they will stay tight. Changes in temperature, vibration and carelessness are frequent causes of poor connections. They should always be kept tight and clean.

Excessive temperatures caused by insufficient ventilation, excessive current or more continuous service than anticipated are reasons why resistors fail from overheating. Loose connections often cause local overheating. Grid or cast-type connectors sometimes break in handling, or as the result of frequent and sudden overheating and cooling. Moisture, dirt and dust are constant sources of trouble with starters, because they reduce the value of insulation on wires and cables. These substances constitute a leakage path across which breakdowns occur between points of different potential, a circumstance that does not happen if surfaces are kept dry and clean. Routine maintenance should remove dirt and dust by blowing with dry compressed air, or wiping or washing with a suitable cleaning fluid. Compressed air should not be used under too much pressure, for it may drive metallic dust and dirt into the insulation or lodge particles between the stator and rotor of motors, or in the moving parts of contactors and relays.



Working parts of relay dashpots are machined to small clearances. See that they move without friction, keep the liquid filled to correct level but use only the recommended fluid

Keep Equipment Dry

Condensation, humidity, spray or overhead dripping are sources of moisture that may enter apparatus. Heaters are sometimes placed within inclosures to keep the electrical device dry. Generally, these heaters are arranged to cut in automatically when the equipment is idle, because when the apparatus is in operation the normal heat of coils and resistors is sufficient. Drip-proof, watertight or dusttight inclosures may be provided where indicated.

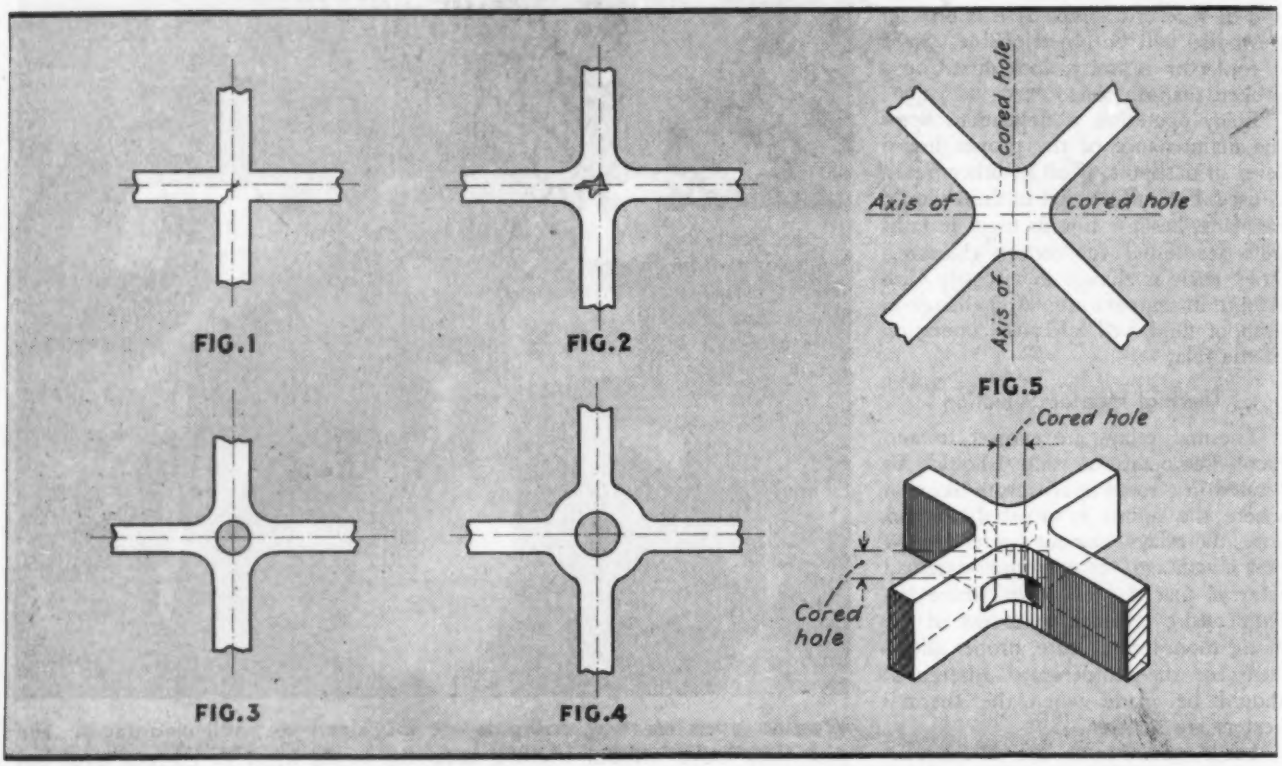
Defective wiring is an outstanding cause of electrical trouble. Moisture in conduit is a frequent source of grounds. These cause false circuits that bring about unexpected starts, prevent stopping by normal means, eliminate overload protection. Any measure to prevent moisture in conduit is good protection. When serious grounds develop, they are eliminated by cleaning the conduit and installing new wiring. Insulation resistance should be checked regularly so that the presence of grounds can be detected and overcome before trouble occurs.

High temperatures within apparatus is a sure sign of trouble. But a coil, motor or cabinet that is hot to the touch is not necessarily operating at excessive temperature. The best procedure is to measure the temperature.

None of these adjustments or replacements is especially difficult. If they are put upon a routine basis and done with motor maintenance, there will be much less reason for interruptions to production in the plant.

Pusher-Furnace Trays and Baskets Designed for Longer Life

BY W. A. HAKIN, ENGINEER, MICHIGAN STEEL CASTING COMPANY



Good foundry practice and beam action at elevated temperatures must be considered for intersections in cast pusher trays and baskets. Fig. 1—Square corners induce cracks. Fig. 2—Rounded corners help but a solid center promotes a fissured shrinkage cavity leading to cracks. Figs. 3 and 4—Cored holes and rounded corners avoid cracks, but the hole will distort under beam action at high temperatures, permitting deformation of the grid. Fig. 5—By coring diagonally at the neutral axis, metal is not removed appreciably in the stressed areas of the intersection, and deformation of the grid beams is eliminated for practical purposes

ONE OF THE simplest ways of conveying work through a heat-treating furnace is by means of the pusher tray. These are often made of 35 percent nickel-15 percent chromium alloy.

Loaded trays are pushed along alloy skid rails or roller rails, and must be strong enough to span between rails and also to carry thrust from the pusher mechanism, remembering that every tray in a furnace must push all the trays ahead of it.

Grid-type trays are usually the most satisfactory because, if made in a reasonable depth, the short members can be designed as beams to span the load from rail to rail, and the long members extending in the direction of travel can be designed to take the thrust from the pusher mechanism. The assumption

These furnace accessories must eventually wear out, but their service life will be extended by observing known structural principles and approved foundry practice during their selection

is that every tray will take the maximum thrust at some time, when it happens to be at the charging end of the furnace with all the other loaded trays ahead of it.

Intersecting members present a problem. It is not feasible to cast stressed members with square corners as in Fig. 1, because cracks are likely to open up from the sharp edges. Fig. 2 shows an intersection with rounded corners. If the corner radius is large enough there will be no trouble from cracks, but a cavity will form in the center as the metal shrinks when freezing from the molten to the solid state. The reason is that metal remains fluid in the center after the surrounding metal has frozen and contracted. In contracting it draws on the still molten metal at the center, leaving an irregular void. An irregular void with its fissures is an excellent starting point for a crack.

Figs 3 and 4 show intersections which avoid sharp corners, and which have round holes cored in the center to prevent shrinks. They are satisfactory

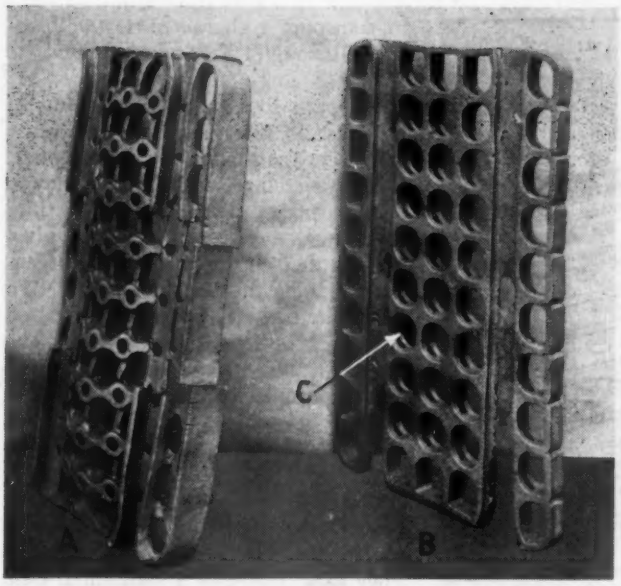
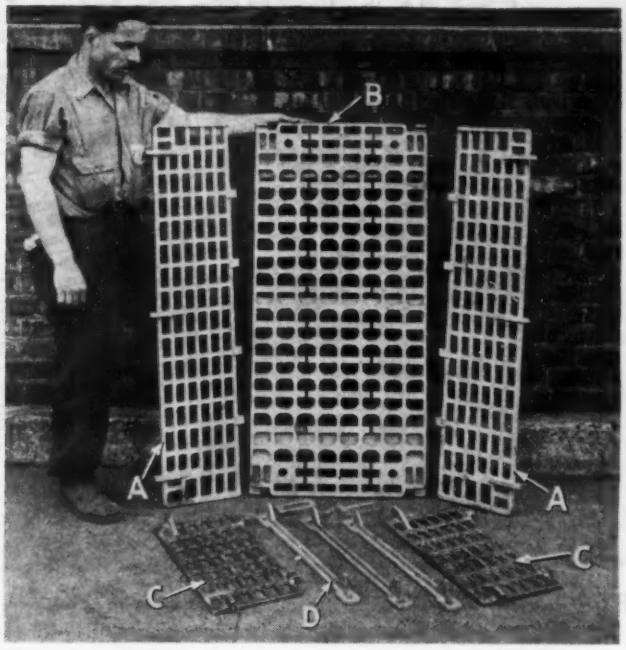


Fig. 6—Ribs of tray A sagged and distorted badly because of lack of continuity through vertical holes at intersections. Tray B remained flat after much longer service because the ribs are cast in a continuous beam effect with the cored holes C at the neutral axis of rib intersections

Fig. 7—Interlocking components of the cast basket for carrying shells are: side plates A, bottom plate B, end gates C, and crossbars D



from the foundry viewpoint, and are the types of intersections conventionally used.

But round holes cored in the manner shown are not ideal in a structural sense. Occurring as they do in the middle of stressed members subject to bending and operating at high temperature where the strength of the material is low, the holes respond to beam action. The material above the neutral axis is in compression, and that below the neutral axis is in tension. As a result the members become deformed when the holes tend to close up and flatten on top, and elongate into an oval shape at the bottom.

Cored at Neutral Axis

A grid intersection patented about three years ago avoids verticaly cored holes. Instead, holes are cored diagonally through the intersection in a horizontal plane, occupying approximately the middle third of the depth. Fig. 5 indicates how this is done. It will be seen that metal is cored out only in the region of the neutral axis where it contributes little to strength. Most of the metal remains in the stressed areas of the section, where it will do most good.

Fig. 6 shows two types of tray used for the same purpose in the same furnace. Tray *A* is the ordinary type which buckled, warped and cracked badly. The primary cause of failure is sagging and bending of the short horizontal beams with the round holes cored through them. Tray *B* is a redesign having horizontal cored holes *C* at grid intersections. It lasted more than twice as long as Tray *A* and remained straight and flat. The cause of failure in type *B* was wearing through of the tray guide surfaces where they rub along the furnace skid rails. Few designs stay straight long enough to fail in that way.

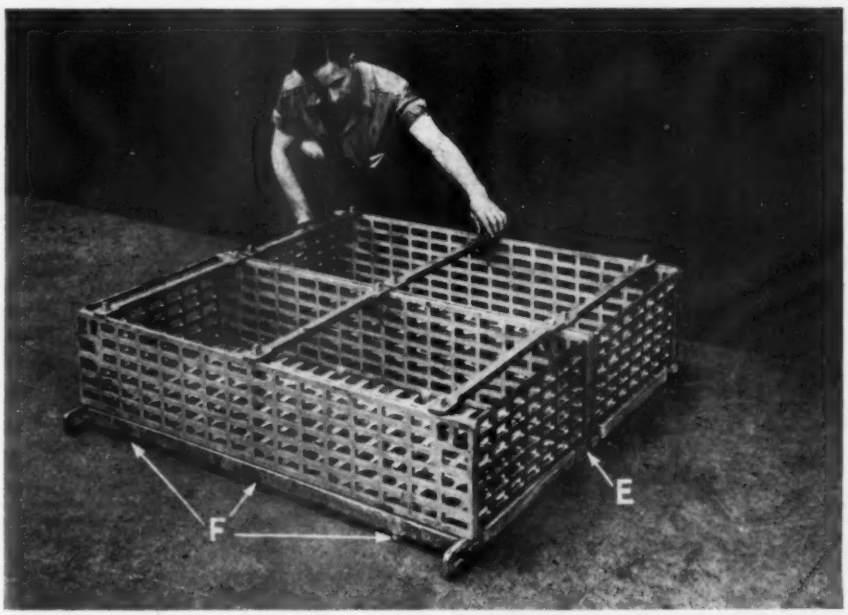


Fig. 8—Two or more baskets are easily connected by cast links E, and they are guided on the furnace skid rails by means of integral tracks, F

Interlocking Basket Members

Fig. 7 shows the various components of a cast alloy basket. The bottom part *B* is the load-carrying member, having the horizontally cored intersections described above. Two side plates *A* and two end gates *C* are lightly loaded and are made with plain chilled intersections. Parts *D* are crossbars for tying the side plates together across the top of the basket.

Fig. 8 shows two baskets assembled side by side. They are connected by cast links *E* which are used to tie two or more baskets together. In one application four baskets are so connected

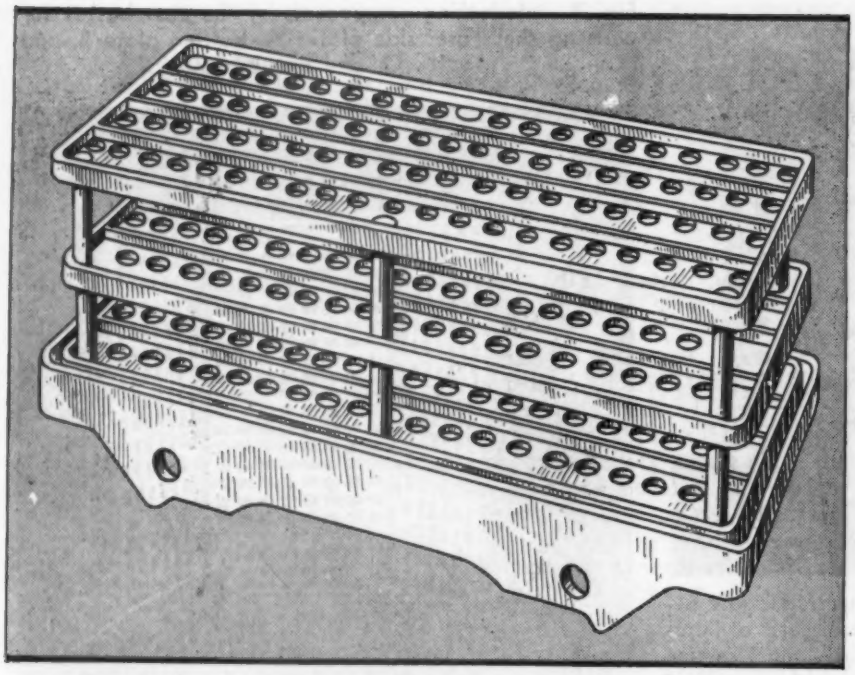
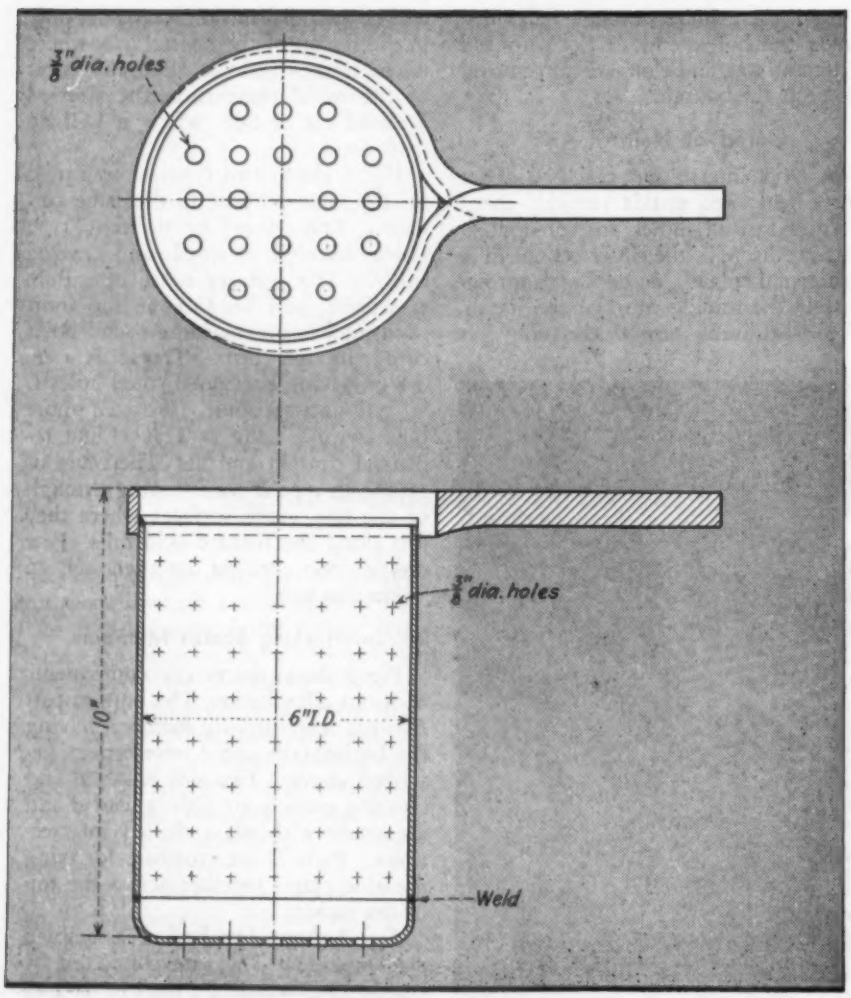


Fig. 9—Two light trays are tiered upon a heavier carrier tray to form a multi-deck assembly for carrying spline shafts



Rolled alloy sheet construction with a cast bale gives lighter weight as well as long service life in the case of a cyanide dipping basket

to transport a charge of 1,500 lb. of shell through a furnace heated to 1650 F.

All parts lock together by means of lugs cast on side plates and end gates, which engage slots in the bottom plate. Crossbars connect with lugs on the top of side plates. End gates have lugs engaging the bottom plate, also pivot lugs at their upper corners to fit enlarged holes in the side plates. To dump the baskets, end gates are raised until their bottom lugs disengage. The gates will then swing outwards on their pivots, permitting the work to roll out into the quench.

Accommodates Many Pieces

Multiple-deck trays are another convenient accessory for pusher-type furnaces. Fig. 9 shows such an assembly. They may consist of a substantial base tray incorporating two rail guides on its underside, with one or more lighter trays decked above. The upper trays have integral legs which set on the tray beneath, to raise them to the required elevation. In one application splined shafts are located vertically in holes cored and reamed through the upper trays. A large number of shafts can be accommodated and heat-treated at one time in this manner. Of course, the same trays can be used for other miscellaneous work pieces laid upon them.

In the case of carburizing boxes and dipping baskets, alloy sheet construction has largely superseded the use of cast materials. The basic idea is to save weight, conserving critical materials, making easier handling, and in the case of carburizing boxes, reducing heating time.

Light-Weight Dipping Basket

Fig. 10 shows a sheet alloy dipping basket used with cyanide. The dished bottom is butt welded to the cylindrical shell. Both parts are in ⅛-in. sheet and suitably perforated. The butt weld avoids a metal overlap which would otherwise give double thickness at the joint. Varying metal thicknesses create temperature differences, causing irregular expansion and contraction. Where the variation takes place in a short distance as in a joint, there is no flexibility to absorb the irregularities, and the joint is likely to crack. Being located well away from the bottom of the vessel, the weld is also relieved from thermal shock when a hot basket is placed on a cold surface. The basket illustrated has a cast bale which in this case is lighter than rolled bar stock. The weight of the complete basket 6 in. diameter by 10 in. deep, is only 11 lb., which is considerably less than an all-cast basket.

Points to Watch in Drill Jig Design

BY C. W. HINMAN

Drill jig efficiency depends upon careful consideration of many factors. Here, for quick review, are several points to keep in mind at all times

Body Construction: Jig bodies of the small channel types, under about 2×3×8 in., are machined from one piece of machinery steel. Larger jig bodies use cold-rolled steel plates assembled by arc-welding. For still larger jig bodies, and their leaves or covers, wood patterns are made for obtaining semi-steel castings. Castings must have allowances for machine finishing, and the finished surfaces must be only those that are absolutely necessary, because often 25 percent of the casting's strength lies in the "skin" of the metal. Patterns and castings require considerable time to make, and steel plates and blocks can be arc-welded together as a substitute.

Strength: Strength of body walls, leaves, clamps, equalizers, centralizers, and all working members of the jig, must be sufficient to neutralize bending stresses when the clamps are tightened against the work. If this precaution is overlooked, the positions of guide bushings may distort when clamping the work.

Pack Case Hardening: Small jig bodies, machined from one piece of steel, can be pack case hardened, straightened in a vise, and then the high spots leveled by surface grinding. This provision favors long wear, and prevents mis-drilling in spots around the bushings. If the jig body is left soft, shouldered bushings tend to avoid results of mis-drilling.

Clearing Jig Handles: Jigs with cam-lock handles must have a minimum clearance space of 5/8 in. between handle and the drill press table. This provides a finger hold for turning the jig over or picking it up.

Easy Handling: Jigs must be lifted, turned over, and the leaf opened and closed frequently, therefore it must be designed for rapid handling with a minimum of fatigue. The tool must be light in weight yet heavy enough to resist wear and bending failures. All sharp corners must be eliminated to expedite easy handling, and sure and positive quick-action fastenings provided. When opening the leaf, it should be halted by a stop, bent at an angle of about 45 deg. and attached to jig body behind the leaf.

Location of Hinge Pins: With the lead opened, and the work being inserted or removed in box jigs, the hinge pin in the leaf and the leaf fastening at the opposite end, must be placed far enough away from the work location to prevent interference with the work-piece. For an ordinary jig this distance must be about 1 in. In larger jigs this distance must be greater.

Equalizers: Equalizers for clamping the work should not be located in a large slot cut through the jig leaf. The slot weakens the clamping power of the leaf, and its hinge-pin hole through the edge of the leaf and across the slot, practically cuts the leaf in two parts. To avoid this, mount the equalizer on the surface of the leaf and hold it by a centrally positioned screw and one pin to prevent its turning.

Work Supports: In either drilling or milling tools, the workpiece must be rigidly clamped and supported in direct opposition to the cutting thrusts. In a drill jig, this means to provide a concentric clearance hole, ten percent larger than the bushing hole, around the "break through" of the drill under the work. In a milling fixture it means that the sides or end of the holding clamps must be not more than 1/32 in. from the edges of the cut. This will assure duplicate work and reduce rejects.

Relation of Work Piece to the Drill: The end of a guide bushing opposite its mouth must be close to the point where drill enters work. This space should be no greater than the diameter of the drill.

Feet: Feet must be provided for elevating the tool to clear shouldered bushings and attached fastenings. This must be done, especially on the jig side that lies opposite the leaf, as it supports the tool while loading and unloading.

Bushings: Lengths of holes through guide bushings must be kept under 2½ to 3 times the drill diameter. If guide hole is too long, drills will heat, clog with chips, distort the hole, and sometimes break. Where long bushings are necessary, the entrance hole diameter must be 30 to 50 percent larger than the drill, and the larger hole must continue from the mouth of the bushing down to where the drill guide begins.

Special Bushings: In designing special bushings, wall thickness must not be less than 3/64 in. for guiding drills up to ¼ in. diameter. For drills above ¼ in. diameter wall thickness of the bushing should be 1/16 in. or more.

Bushings in the Leaf: For accurate drilling, guide bushings should not be located in a movable leaf unless work positioning gages are attached on the leaf. If gages are independent from a leaf that carries bushings, erroneous drilling will result, when bronze pins and leaf guides become worn. However, for drilling non-precision work, bushings may be located in the leaf if the hinge pins and leaf guides are properly protected from wear, and if the leaf shuts tightly against a positive stop.

Drill Burrs: Drill burrs must be provided for by slots and recesses that clear them. This facilitates removing the workpiece from the jig and prevents the work from being "burr bound" after drilling. Pins that pass through the jig walls are sometimes used to eject the work if it adheres too tightly in the jig.

Cleaning Jigs: Provide scavenger holes through jig walls near the gaging points of the work and use every precaution to keep the jig interior free of dirt, chips and oil. Working surfaces must be easy to clean before reloading. In large jigs, scavenger holes of generous size will decrease weight.

Designing and Drawing: Select the proper type of jig design by making freehand sketches. In drawing the jig, make full size views if possible, or at least half size. Lay out the plan view of the work in red dotted lines. Project the side elevations from the plan if drilling occurs there, or where work fastenings must be shown. Allow spaces between the views for drawing jig walls, thumb screws, or clamps and for adding dimensions. Draw jig walls around views of the work and draw in gages and stops. Add a leaf, key, cams, clamps, thumb screws, or whatever fastenings are necessary to hold the work. If the bushing holes are to be bored on a jig-boring machine give "stepped dimensions" for locating the bushing centers from gaging points, give them from left to right and from the top down. Material lists should appear on the assembly sheet.

Eastern Aircraft Has Successful Plan for Hiring Veterans

EASTERN AIRCRAFT DIVISION, General Motors Corporation is employing discharged service men, through interdepartmental coordination, psychological and physiological examination, supervisor training and follow up.

Placement procedure is divided into four major steps: employment interview, medical examination, acceptance or rejection, and induction.

In addition to regular hiring procedure, the employment interviewer makes a cursory effort to determine the veteran's physical, mental and emotional status and keeps this in mind in placing him.

The medical examination includes not only the recording of psychological and physiological facts and the taking of tests, but also the physician's consideration of the applicant's suitability for the job recommended by the employment office. If rejected, the doctor specifies conditions under which the veteran would be employable and returns him to the employment office. In many cases it is desirable for the doctor to consult directly with the employment office as to a possible job.

Depending upon their physical condition, the disabled veterans are classified so that those having serious visual defects, diabetes, heart disease or hand or arm disabilities do not work with hazardous machinery. Men who are suffering from back injuries or other disabling conditions are placed in jobs where there is no heavy lifting. Other groups, depending upon their condition, are given jobs where their handicaps will not be hazardous. For instance, those suffering from lung ailments are not asked to work where there is dust or fumes, those with leg injuries are not given jobs requiring extensive walking or standing, and those with ear ailments or partial deafness are not asked to work in departments that are noisy.

A few cases are rejected because they are not yet fit for any work or because Eastern Aircraft does not, at the time, have the right job for them.

Men released by the services fall into two groups. That is why the industrial plant must train its supervisory staff to recognize problems that arise and assist the personnel and medical departments in seeing that these men make good

Severely disabled veterans are given special treatment and careful supervision and training to fit them for jobs they can do. Veterans temporarily unable to work or those requiring extensive vocational rehabilitation are referred to the Veterans' Administration.

Induction of all new employees is largely conducted by the educational department. Efforts are made to show veterans that their employers understand the problems they are up against and wish to help them readjust themselves to civilian life and, secondly, that they do appreciate the risks they have taken and the privations they have suffered. With these two aims in mind, the program is designed to be neither soft and sentimental nor harsh and critical, but simply according to the needs of the individual veterans with disabilities are put in jobs where they can compete with other workers.

The handicapped worker is paid the full rate for the job assigned.

In working with ex-service men, Eastern Aircraft officials believe it essential to remember that the great majority do not want a dole or a handout. What they do want is a chance to do an efficient day's work and a fair return for their services. Thus, the rehabilitation program is designed to be on a sound economic basis.

Supervision does not end with the placement of the veteran in the proper job. A five-part follow-up program is designed to aid him from then on.

With the thought that foremen and supervisors come most directly into contact with the veteran and can do most to aid him, they have been trained in rehabilitation as an integral part of the supervisory training program. Under this training program, the supervisors had impressed upon them the obligation existing to aid these men in regaining their economic self-sufficiency. Foremen report to the employment office any case that does not seem to be adjusted in his job, with recommendations as to the type of work he might be fitted for, thereby spotting problems before they become insurmountable.

"It should be recognized," states the outline presenting the plan to the various com-

A former Marine Corps corporal, medically discharged after a bomb concussion ended his four years of service, now operates a punch press at Eastern Aircraft Division. Some men, so injured, cannot endure the noise of metal working departments and must be moved to quieter employment

pany divisions, "that an individual with a severe handicap is not likely to have the same confident mental attitude of the normal healthy person. He may doubt his ability to overcome this handicap. He may worry unduly about his future and security. This factor should be understood by supervision and should be borne in mind by those who train and direct the work of the handicapped."

Supervisors will be urged to deal with each veteran individually, and to become his friend in order to help him in his adjustment to civilian life.

Said A. A. Hendrix, director of personnel, Eastern Aircraft, Linden Division, speaking before a meeting of the Industrial Hygiene Foundation, "I think one of the biggest jobs ahead of us is to educate the supervisory force in the plant that the returned soldiers break down into two major groups:

"Group I—the so-called 'misfits' who have never seen combat service and who have been entirely unable to fit into any training or regimentation program. We must not allow this group to cast a stigma or reflection on all returned soldiers. This can so easily happen since the foreman out in the plant, unless we are careful, will class all returned soldiers as a group. Up to date a large percentage of the group returning has been of so-called 'misfits' which are often extremely hard to rehabilitate for any job.

"Group II—is made up of soldiers who have been ordinary individuals trying to fit into a program, but who may have to be returned due to injuries or illness. The rehabilitation of this group has been more successful, the mortality rate very low, whereas in Group I it has been fairly high."

Foremen and supervisors have shown a good attitude and believe that the hiring and training of ex-service men gets results. Most of the foremen and supervisors have relatives and friends in the service, and this has furthered their sympathetic attitude toward the returned men. In the majority of cases, they have gone out of their way to aid the veterans, without having had any special training.

The personnel and medical departments work together in an effort to maintain contact with veterans who need further physical rehabilitation and with those who need aid in their contacts with other employees. Men with mendical conditions which require observations and treatment, come regularly to the plant hospital.

Plans are being considered, some being put into operation, to give these veterans further training. Those working with them have found that most veterans are much concerned about the future, feeling that while they were in the armed services their careers were at a standstill. Veterans have the same opportunity as other workers to enroll for plant training, such as in the toolroom-trainee program and welding and riveting schools.

Dr. Gordon Eadie, Linden plant physician, examines left foot of an ex-Marine now employed at Eastern Aircraft Division and receiving training in the welding school there. Constant surveillance of veterans' injuries prevents aggravation; minor ailments are treated in the plant hospital

Qualified younger veterans are being enrolled in the General Motors Institute at Flint, Michigan, as cooperative students from Eastern Aircraft.

Persons who have disabilities, once placed, are not moved to other essentially different jobs without having first had a supplemental placement examination by the plant doctor. When the man fails for one reason or another to adjust in the job assigned, he is referred to the personnel office. He is there interviewed and an effort is made to determine the cause for malajustment. He is then referred to the medical department. After making an examination, the physician discusses the case with the personnel division, and a disposition of the matter may take several courses. In some cases the veteran is referred to the nearest Veterans Facility, in others he is released to find a job elsewhere, according to his needs.

More than 500 newly returned veterans are now employed at the Linden Plant of Eastern Aircraft Division; others are being hired as need arises.

Problems for Machine Tool Designers

Machine tool designers are being faced with several new problems. The extremely high cutting speeds now practiced on both aluminum and steel make it necessary to provide for higher speeds than ever before, for machining both steel and the lighter methods. Although cutting speeds of both have been materially increased, the discrepancy between the speeds for the two types of metals will doubtless make two distinct lines of machines necessary. This would seem to be particularly desirable where the cuts are long as in the case of the spar miller.

On short cuts, however, the designer is confronted with a different problem. He must consider the handling time as well as the time taken by actual machining. In turret lathe work for example the average cut is so short that any saving by extremely high cutting speed is largely nullified by handling time. Unless the total time of making a given piece can be materially reduced, the saving of a few seconds in machining may cost more in tools and power than the saving is worth. It is the *net*, total saving that really counts.

Charts Simplify Punch Press Loading

BY D. E. HAYES

Quick reference form makes it easy to determine tonnage required for blanking. A chart listing press specifications is also used for proper loading

PUNCH PRESSES were rarely used in the airplane industry until recently, but now most fabricated parts are formed on such equipment. With the increase in use of such parts came a need for proper press loading to attain most efficient production.

Following the press loading systems of other industries was not too satisfactory for aircraft work, because most systems in vogue did not cover materials being used in plane manufacture. Too, the use of women and other inexperienced help precluded the possibility of determining what press a die should be used on by simply looking.

Surveys were undertaken to establish the essential differences between punch press usage in the aircraft industries as opposed to most metal fabricating plants. In such surveys it was found that, generally, industry was using formulas from various engineering handbooks. Of these, the most commonly used was:

$$\frac{T = S \times t \times l}{2000}$$

In which T is tonnage of the die; S is shearing strength of material in psi.; t is thickness of material in in. and l is length of contour of the blank in inches.

This formula is based on tonnage of the cutting die, or the maximum pressure required to cause it to cut a blank. It is figured by multiplying the shear strength of the material to be cut or formed by the area sheared and dividing the result by 2,000. Shearing strength of materials was found by referring to engineering handbooks or strength of materials tables.

Shearing strengths for some of the commonly used materials were usually given as follows:

Material	*Shearing strength in psi.*
Aluminum	12,000
Copper	30,000
Low-carbon steel	50,000
High-carbon steel	75,000

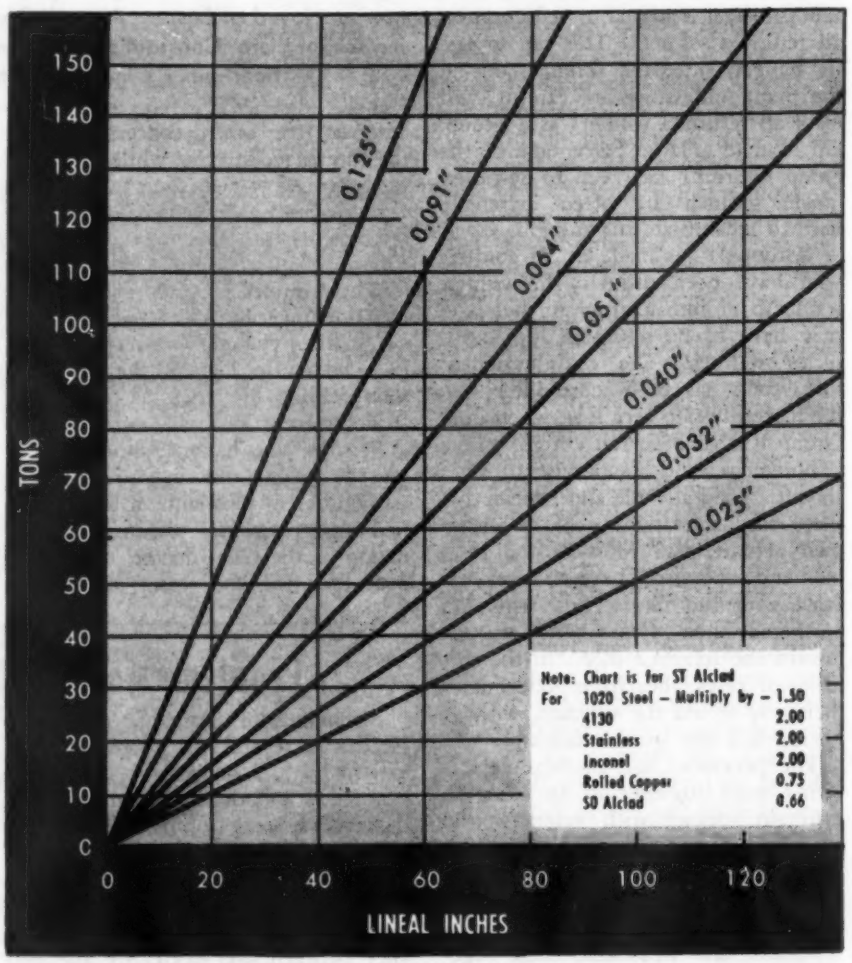
This formula applies only to flat punches and dies that do not have shear. The effect of shear is to reduce the length l in contact with the cutting edge at any instant and thus reduce the pressure required. Experience shows that this applies primarily to heavy blanking dies and thus can be disregarded on practically all aircraft blanking dies, for use on aluminum.

Several large aircraft companies used this, or similar formulas developed by their own engineering departments with consideration given to aircraft materials. Others determined blanking pressures by placing dies and parts to be blanked under a hydraulic press.

Usually it is necessary to know the tonnage in advance in order that it may be known what press the die is being designed for, as different dies have varying characteristics such as shank size, bed size and shut height.

Most parts to be fabricated in punch presses were to be made of aluminum and were to be only blanked, blanked and pierced or cut-off. This meant that tonnage would not be high and on some of the softer grades of aluminum, in light gages, size of the blank would be larger than the bed of a light-tonnage punch press.

BLANKING PRESSURES



This chart was developed, from standard formulas, to determine punch press blanking pressures. Diagonal lines are for various thicknesses of materials. As the chart was based on tensile strength of ST aluminum, conversion factors are given for other aircraft metals

MACHINE LOADING DATA — PUNCH PRESSES

	Description	#269 Bliss Kick	#13 Stoll O.B.I.*	#3 Niagara O.B.I.	#93 Toledo S.S. x
1	Work Center	1701	1702	1703	1713
2	Lockheed Number	3088	1514	579	603
3	Rated Capacity in Tons	2.5	10	15	125
4	Strokes per Minute	——	184	125	36
5	Action	Single	Single	Single	Single
6	Crank Shaft	Single	Single	Single	Double
7	Cam	No	No	No	No
8	Back Geared	No	No	No	Yes
9	Stroke of Ram	4.0	1.5	1.5	8.0
10	Stroke of Hold Down	——	——	——	——
11	Ram Adjustment	——	1.5	2.25	3.5
12	Hold Down Adjustment	——	——	——	——
13	Min. Shut. Height—Ram to Bed	1.0	3.75	4.00	12.0
14	Min. Shut. Height—Hold Down to Bed	——	——	——	——
15	Max. Shut Height—Ram to Bed	——	5.25	6.25	15.5
16	Bolster Plate—(L-R)	10	15	16	47.25
17	Bolster Plate—(F-B)	10	9	10	33.375
18	Bolster Plate—Thickness	No Plate	1.125	No Plate	3.75
19	Bolster Plate Opening—(L-R)	——	3.5	——	1.5 Dia.
20	Bolster Plate Opening—(F-B)	——	4.5	——	1.5 Dia.
21	Bed Opening—(L-R)	3.0	8.0	7.875	39.0
22	Bed Opening—(F-B)	3.0	6.0	4.5	21.0
23	Aux. Bolster Plate (L-R)	18.0	14.0	15.5	47.25
24	Aux. Bolster Plate (F-B)	12.0	8.75	9.0	33.375
25	Aux. Bolster Plate—Thickness	1.0	1.5	1.0	3
26	Aux. Platten—(L.R)	6.0	6.0	6.0	22.0
27	Aux. Platten—(F-B)	9.0	9.0	9.0	42.0
28	Aux. Platten—Thickness	.75	1.0	1.125	4.0
29	Shank Dia	1.25	1.562	1.562	2.0
30	Punch Holding Bolts—Dia.	.50	.50	.625	1.0
31	Face of Ram to K. O. Slot	——	——	——	——
32	Throat Clearance—Ram and to Uprights	6.0	4.5	4.0	——
33	Throat Clearance—Between Uprights	6.5	7.0	7.5	——
34	Floor Space—(L-R)—Ft. and In.	2'– 0"	2'–3"	2'– 7"	7'–0"
35	Floor Space—(F-B)—Ft. and In.	2'–11"	2'–7"	2'– 6"	7'–0"
36	Overall Height—Ft. and In.	4'– 4"	7'–4"	6'–11"	11'–3"

* O.B.I —Open Back Inclineable. x S.S.—Straight Side.
Note: All dimensions in inches unless otherwise indicated.

In punch press loading, a table such as this is extremely helpful. Although just a portion is shown, the complete table contains the same information for all presses in the plant

As no one was permitted to figure tonnage, except leadmen and group leaders, the use of such formulas required much of the time of these men. Furthermore, it caused delay and confusion when several new dies came in at one time—many of them late.

To avoid using formulas, Lockheed developed a blanking pressure chart made for 24 ST aluminum, which represented most of the work volume. Provision was made for other types of aircraft materials through listed conversion factors. Most conversions are in simple multiples which allow a slight safety factor; a desirable feature. Bottom line of the chart represented lineal in. to be cut at 0-ton pressure and each parallel line above represented one ton of pressure. Diagonal lines represented thickness of materials.

In using the chart it is necessary only to measure the lineal inches to be cut by the die, including holes or cutouts. (For best results, the die itself should be measured to determine lineal in.) As an example, take a piece of 0.025 ST aluminum having 60 lineal in. to be cut or blanked. Locating 60 on the bottom line, the intersecting line would be followed upward until it crosses the gage line for 0.025 in. material. On the chart prepared, following this course would show an answer of 30, or 30 tons pressure required for blanking. If the same conditions existed, but the material was stainless steel, the answer would be multiplied by the conversion factor 2, to show 60 tons pressure needed.

After tonnage is determined it is then necessary to choose the press on which the die should go. Capacities are known or easily determined for all presses, thus the remaining factors governing choice of the press are:

A. Shank diameter, if any.
B. Size of bolster plate.
C. Shut height and ram adjustment.

Anent these factors it is important to note that many dies, especially the

Kirksite type, do not have shanks; dies for light gages of SO aluminum may have to be used on presses of the next higher tonnage rating, and it may be necessary to use auxiliary bolster plates because of limits of shut height or ram travel.

Approximately 75 percent of airplane dies can be loaded properly with the enumerated factors known, but, as other factors must be known in certain instances, another chart was prepared covering all presses and listing all available information. Designers also use the chart in planning dies.

After all information is determined for a job, these data are recorded on a file card, known as a machine loading ticket, for future reference. The card also make provision for recording type of stock used—strip, individual piece or roll—and the type of die used—standard, bolt down or Kirksite.

Use of these charts and information on the loading ticket makes it possible to load dies on proper presses. The result is more production, for if a heavy tonnage die is loaded on a light press, there is danger of breakdown. On the other hand, if light tonnage dies are loaded on heavy presses, which are slower acting, production is not as high as it could be.

It has been found best to measure the die itself when determining linear inches of cutting and blanking edges

Industry Will Require Much Postwar Vocational Training

BY H. W. ARLIN, MANAGER OF INDUSTRIAL RELATIONS,
WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, MANSFIELD PLANT

VOCATIONAL EDUCATION will assume even greater importance in the industry-labor-consumer picture after the war. Certain occupations and processes dominant in the manufacture of household appliances have almost disappeared from the scene. Among these can be included such processes as procelain enameling, plating and synthetic finishes along with such allied occupations as polishing, buffing and spraying. Such a situation forecasts a postwar retraining program in which employees will be required to relearn certain techniques acquired and maintained only through constant application or practice.

A large consumer demand is being built up for the purchase and use of electric appliances. Increased personnel will be required, and for them an adequate training program. This need will be accentuated by the failure of service men to return to their former jobs.

One of the foremost occupations to be given attention in the postwar training program will be that of tool and die makers. Wartime, single-purpose training, although satisfactory for most production requirements, is not satisfactory for the building of tools and dies. The need for tool and die makers is particularly urgent in the home appliance field because of the annual change in styles and designs to meet an ever-changing demand. With the almost complete stoppage of apprenticeship training, many skilled craftsmen are reaching retirement age.

The boy who has had machine shop training in high school or in a vocational school will be the one most in demand for industrial apprenticeship programs.

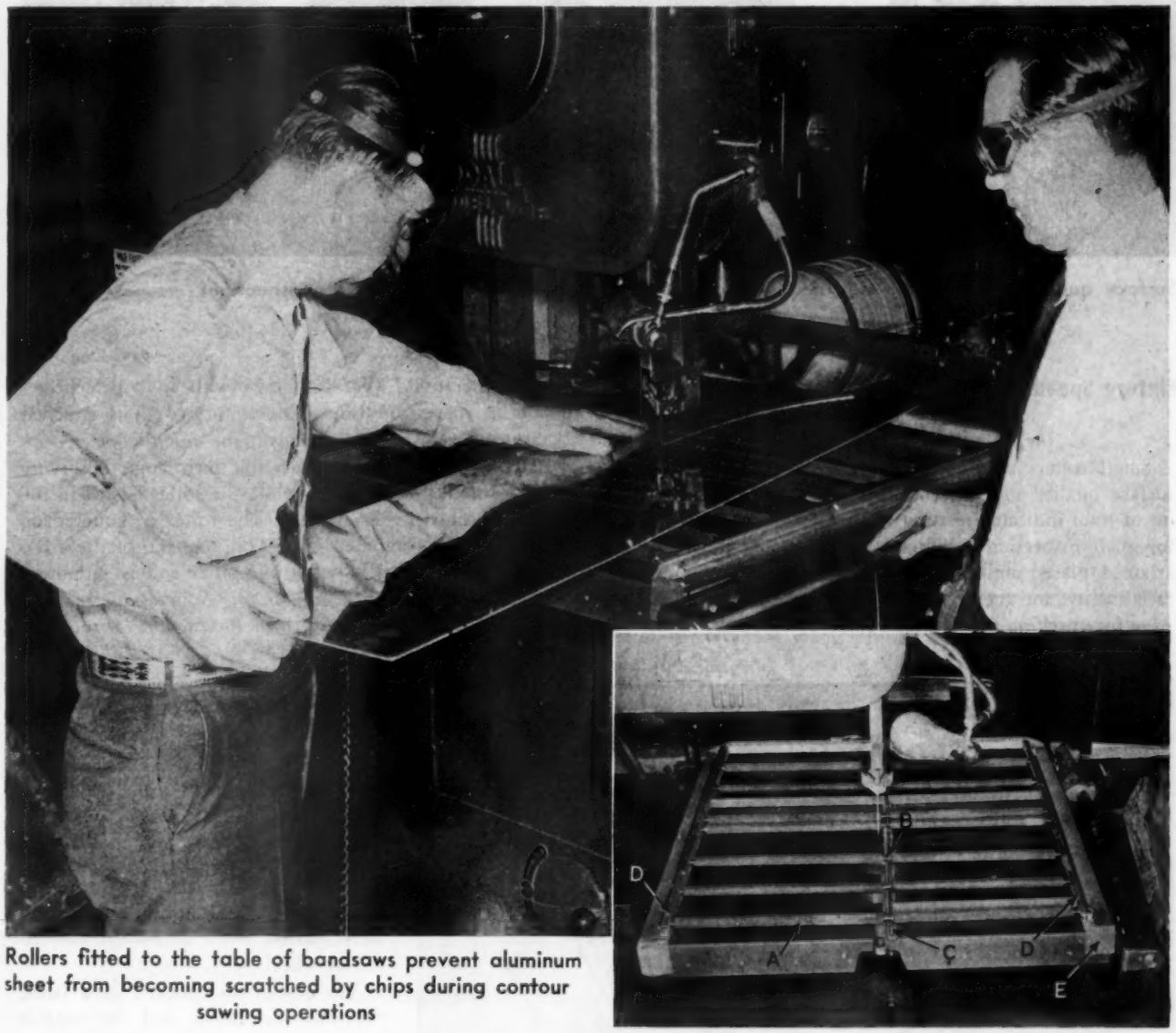
Another type of training or experience closely allied with that of machine tool operation and one to which many vocational schools can contribute is that of machine repair. Such training could include remachining of bearings, recutting of shafts, alignment of parts, scraping in ways, and similar repair operations. Included might well be a study of hydraulic circuits.

The continual rearrangement and installation of plant facilities along with the upkeep of such facilities will continue to require a large number of men training in the maintenance crafts.

Vocational training programs, wherever possible, should be designed to meet local conditions and the needs of local industry.

Practical Ideas

★ **War-Winning Suggestions appearing on these pages were selected from those recognized as meretorious by the Board for Individual Awards, War Production Drive. They are freely offered to industry as an aid to war production** ★



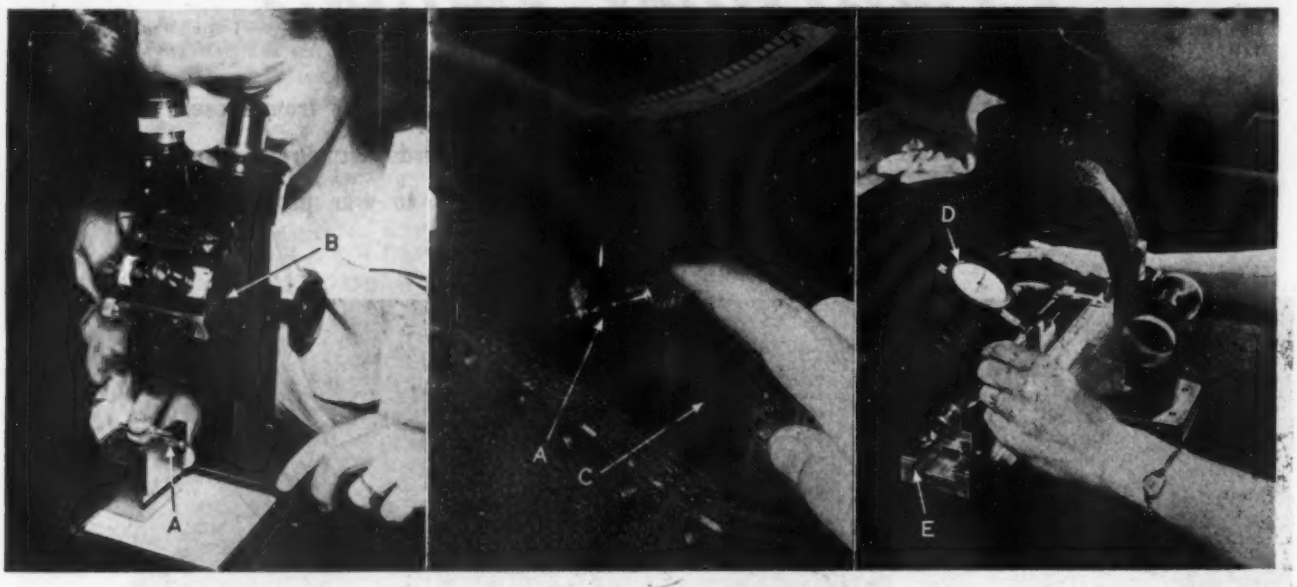
Rollers fitted to the table of bandsaws prevent aluminum sheet from becoming scratched by chips during contour sawing operations

Rollers Speed Sawing of Aluminum Sheet

By LOWELL H. HURT
United Air Lines Transport

The illustrated set of rollers installed on the table of a Doall saw is used when cutting aluminum sheet to a contour layout and prevents scratching of the sheet. Such scratching often occurs when the sheet is laid on the flat table and saw filings or chips get underneath it. The scratches have to be removed with emery paper, increasing production time and costs, especially when scratches are so deep that the sheet has to be scrapped.

Rollers *A* are made of wood, drilled for a tight fit of the shafts. The shafts extend through pairs of rollers, space *B* between them allowing the shafts to rest in notches cuts in inverted T-bar *C*. The ends of the shafts fit in Z-sections *D* riveted to frame *E* that clamps to the saw table. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



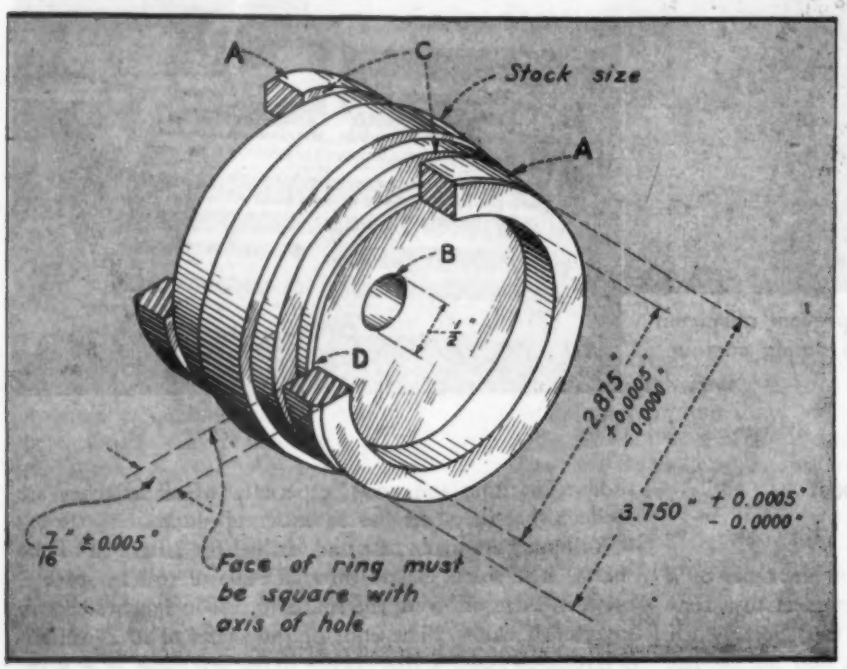
Surface quality and concentricity of gun-sight rollers, formerly requiring two separate inspections, are now checked in one operation with the aid of a dual inspection fixture

Fixture Speeds Inspection of Rollers

By RUSSEL PUTERBAUGH
The National Cash Register Company

Small rollers used in gun sights must be checked for surface quality and concentricity, the latter within 0.0002 in. of total indicator reading. The method previously used for such inspection required the rollers be mounted on arbor *A*, placed under microscope *B* for examination of surface quality, and then rotated in V-block *C* under a shadow gage for checking concentricity.

These operations were combined with a 50 percent reduction in inspection time. Dial indicator *D* is attached to fixture *E*, an integral part of the microscope set-up. Operator rotates the roller under the microscope, observing condition of the surface, and while the roller is still in the fixture, concentricity is checked. The roller is mounted on an arbor for the combined inspection, one end of the arbor being fixed permanently, while the other end is supported by a retractable center. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Identical rings were machined on one piece of stock, and were hardened and ground before parting them from the stock

Precision Rings Made in Pairs

BY DAVID TUCKSCHREIDER

We had to make two identical hardened and ground rings *A*. This was done by taking a piece of 4 in. diameter stock 2⅝ in. long and machining a ring at each end of it. After hardening and grinding, the rings were parted with a resinoid-bonded cut-off wheel.

The stock was chucked in a lathe, the end was faced, and the outside diameter was turned to 3.765 in. for a length of ⅞ in., thus leaving 0.015 in. for grinding. The inside diameter was bored to 2.885 in. for a depth of ⅞ in., leaving 0.010 in. on the diameter for grinding. The end of the piece was then chamfered 1/16 in. x 45 deg. These operations were repeated on the opposite end of the stock, and ½ in. hole *B* was drilled to facilitate heat-treatment.

Grooves *C* ⅛ in. wide were cut to

within 3/32 in. of the bored hole. V-grooves *D* were then cut opposite grooves B, leaving a wall thickness of 1/32 in. The outside edge of grooves *C* were 7/16 in. plus 0.020 in. from the ends of the rings, the 0.020 in. stock being left for surface grinding. After cutting these grooves, the piece was hardened. Distortion is minimized during heat-treatment by passage of quenching oil through hole *B*.

It was again chucked in a lathe and the outside diameter, inside diameter and ends of the rings were ground to size, using a toolpost grinder. The rings were cut off with a resinoid-bonded grinding wheel, and the second face of each ring was surface ground. In this way, the inside and outside diameters of both rings were concentric, and the ends kept square with the diameters.

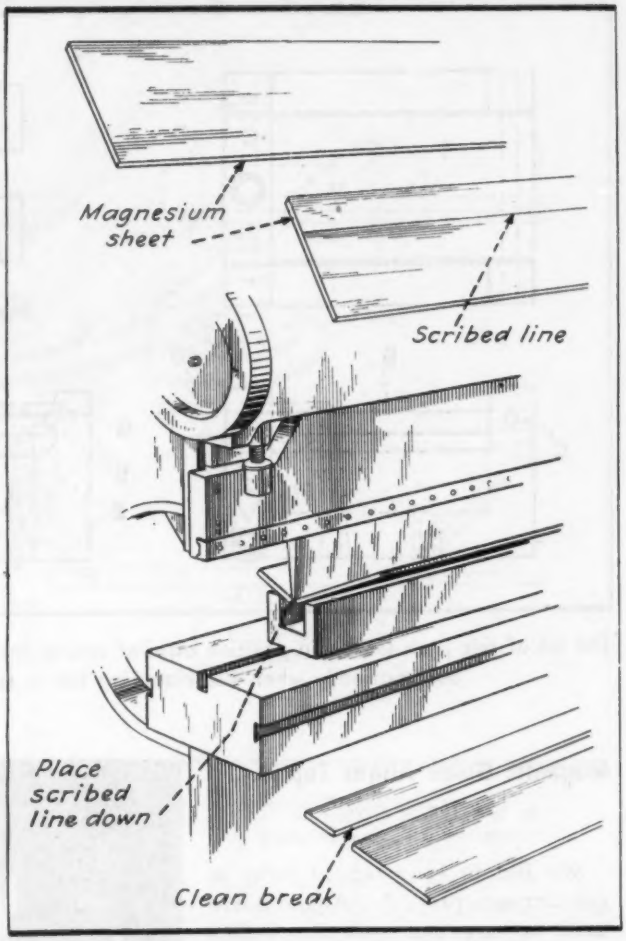
•

Simplified Method of Cutting Magnesium

By STANLEY CARROLL
Northrop Aircraft, Incorporated

The common method of cutting magnesium sheet stock is to scribe the layout line and saw to the layout. Since it is generally impossible to saw exactly to the line, the cut edge has to be filed or sanded to bring the sheet to desired dimensions. Such filing and sanding is an exacting procedure and if at any time the scribed line is crossed, and the sheet thereby trimmed beyond dimension, the sheet must be scrapped. To circumvent these difficulties, we now use the following method for cutting magnesium sheet of various lengths along a straight line.

The sheet is scribed to the proper dimension and placed under a bending brake, with the scribed line down. When pressure is applied to the opposite side of the sheet, directly above the scribed line, a clean true break results. Filing is unnecessary, except to smooth the broken edge. On one job, the magnesium sheet is now laid out and cut in 10 minutes, whereas laying out, sawing and filing under the old method required 30 minutes. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Magnesium sheet stock can be cut to a layout by scribing the line and breaking the sheet in a bending press. The break is clean and requires no filing

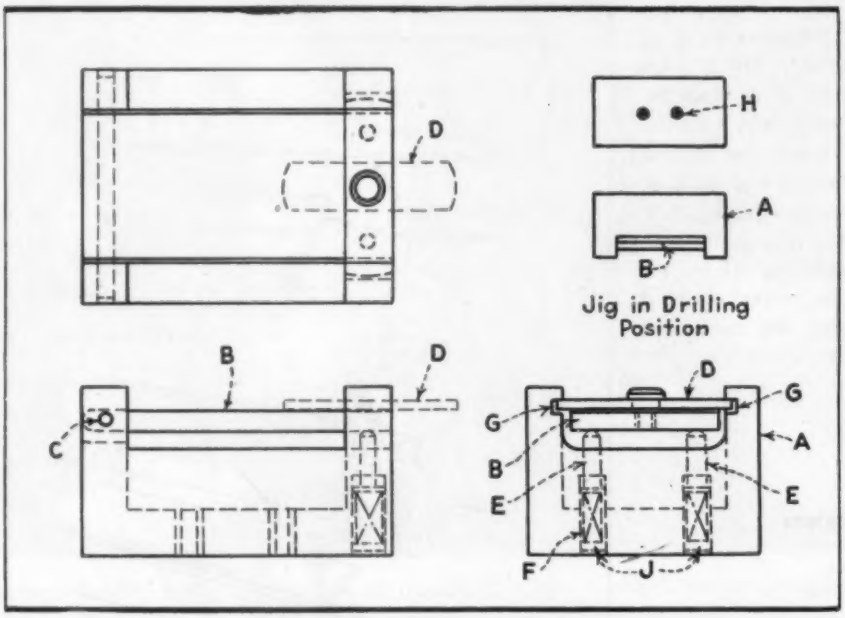
•

Sander Removes Box Markings

By M. F. EMET
Westinghouse Electric & Manufacturing Company

An electric portable sander equipped with a coarse sanding disk removes box markings at a rate faster than conventional methods. Use of this equipment leaves the surface clean and smooth, similar to new boards. The two boxes to the right and left of the operator show such surfaces after completion of the sanding operations. This method makes it possible to re-use crates and boxes without dismantling them, remove markings and nailed ends, and make new boxes from the reclaimed boards.

A rough sanding disk will remove stencilled lettering from boxes and crates in minimum time



The lid of this jig is locked in position against spring pressure. The lid opens automatically when the clamping bar is released

Quick Action Lid for Drill Jigs

By ALEX S. ARNOTT

The jig lid shown in the drawing is applicable to many types of drill jigs, and opens under spring action to facilitate loading and unloading workpieces. In the design shown here, body *A* serves to locate the work to be drilled. Lid *B* encloses the work in the jig and is hinged on pin *C*. When it is swung down, with bar *D* in the open position as shown by the dashed lines in the top view of the jig, the lid rests on the tops of pins *E*. It is lowered slightly below this level by compressing springs *F*. Bar *D* is then turned 90 deg. to enter slots *G*. The jig is then turned over for drilling the part through bushings *H*.

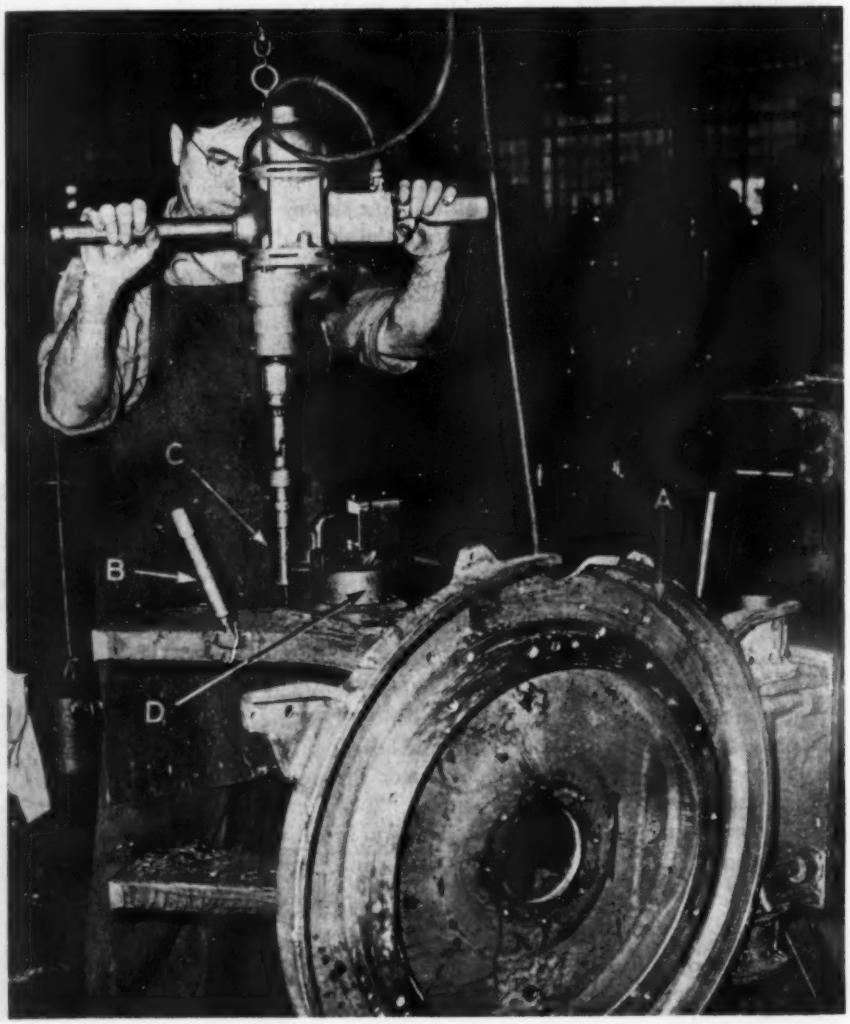
The jig is again turned over and bar *D* swung into open position. Springs *F* force the lid open. Spring tension is adjusted by screws *J*.

Magnetic Guide Aligns Tap

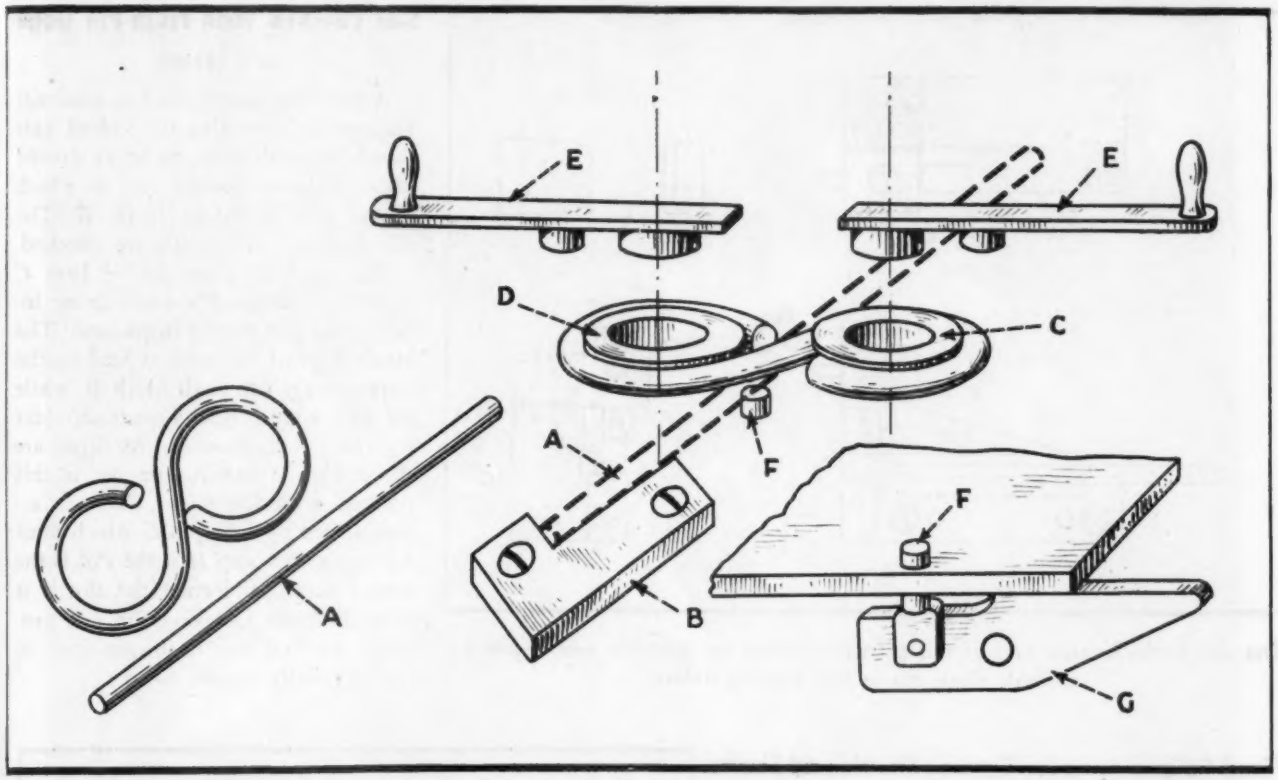
By WALTER A. SWIGART
Firestone Tire & Rubber Company

We had to hand tap 59 holes in gun-carriage part *A*. Aligning the hand tapping tool with the drilled holes proved to be slow and expensive, and misalignment resulted in scrapping this expensive piece of equipment. In order to assure alignment of the tap and hole, the illustrated magnetic device was built.

Aligning pin *B* is first placed in sheath *C* and centered in a hole. Then magnet *D* energized. The aligning pin is removed and the sheath used as a guide for the tap and its bushing. The latter is fitted with an extension that connects to the spindle of a reversible air motor through a universal joint; thus the tap is aligned quickly and accurately with the drilled hole. The use of the device has doubled the efficiency of the tapping operation, with no scrap loss from improper tapping. Based on current production schedules, this device saves 900 man-hours each month. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



The tap for threading holes in this gun-carriage part is aligned to the holes by a magnetic guide bushing

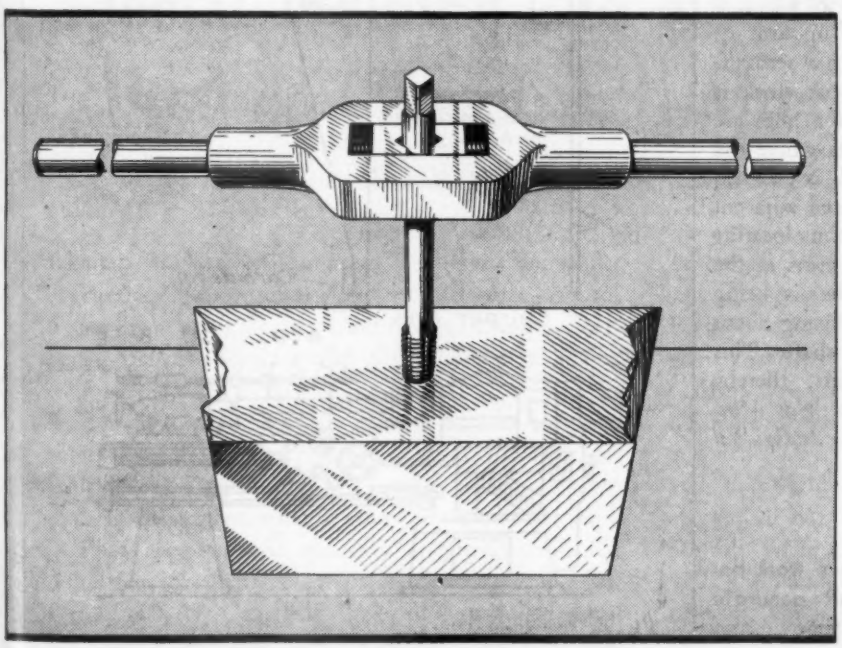


Bar stock up to 1/4 in. diameter can be bent in this fixture to form S-hooks with uniform loops

S-Hooks Formed by Bench Fixture

By H. M. WITHAM AND E. E. COLBY
Bath Iron Works Corporation

The fixture shown in the drawing forms S-hooks quickly, and assures uniform size of the loops. Straight stock *A* is set against stop *B* and extends between tool blocks *C* and *D* that are screwed to the workbench. Handle *E* is fitted in tool block *C* and is rotated to form one eye on the hook. Afterwards, it is set in tool block *D* to form the other eye. The finished hook is pushed off the tool blocks by ejector *F*, which can be operated by light hand pressure on lever *G*. Blocks *D* and *C* can be changed as desired to form loops of various diameters. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

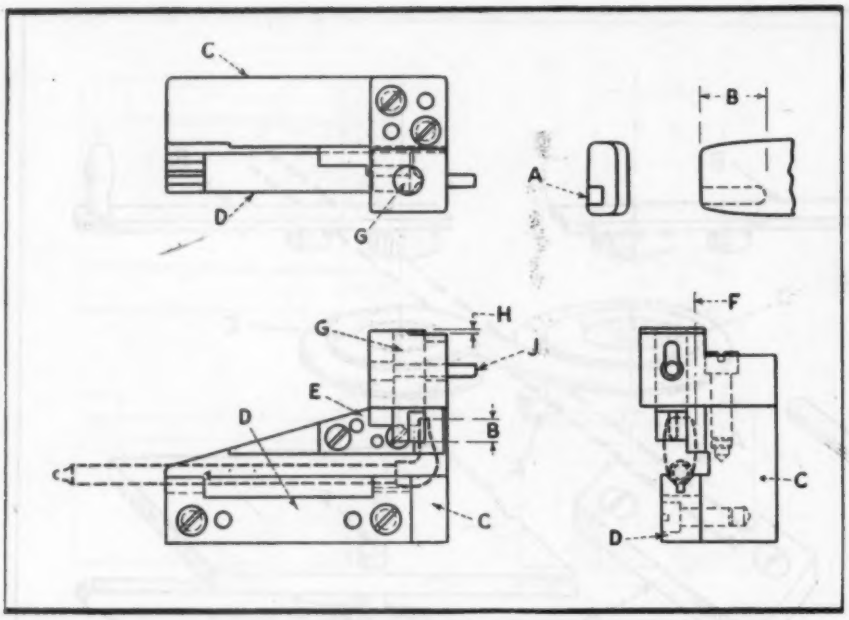


Reducing Tap Breakage

By L. KASPER

The unskilled worker's first experience in tapping holes usually results in frequent tap breakage. Even after he develops the "feel" of the tools, breakage will occur. This can be minimized by attaching the tap wrench to the round shank, as shown in the drawing, rather than to the square end. Then, if the tap jams, the wrench will slip instead of applying excessive torque that breaks the tap. This method is especially effective when tapping holes on the lathe with the end of the tap supported by the tailstock center.

Tap breakage can be reduced by applying the wrench to the round shank. It will slip if the tap jams



The slot in the hooked end of this part is checked for location and depth by a single flush pin in this gaging fixture

Slot Checked With Flush-Pin Gage

By F. SERVER

A flush-pin gage is used to good advantage for inspecting the slotted part shown in the drawing by heavy dashed lines. It has a hooked end in which groove *A* is milled to depth *B*. The slot location and depth are checked.

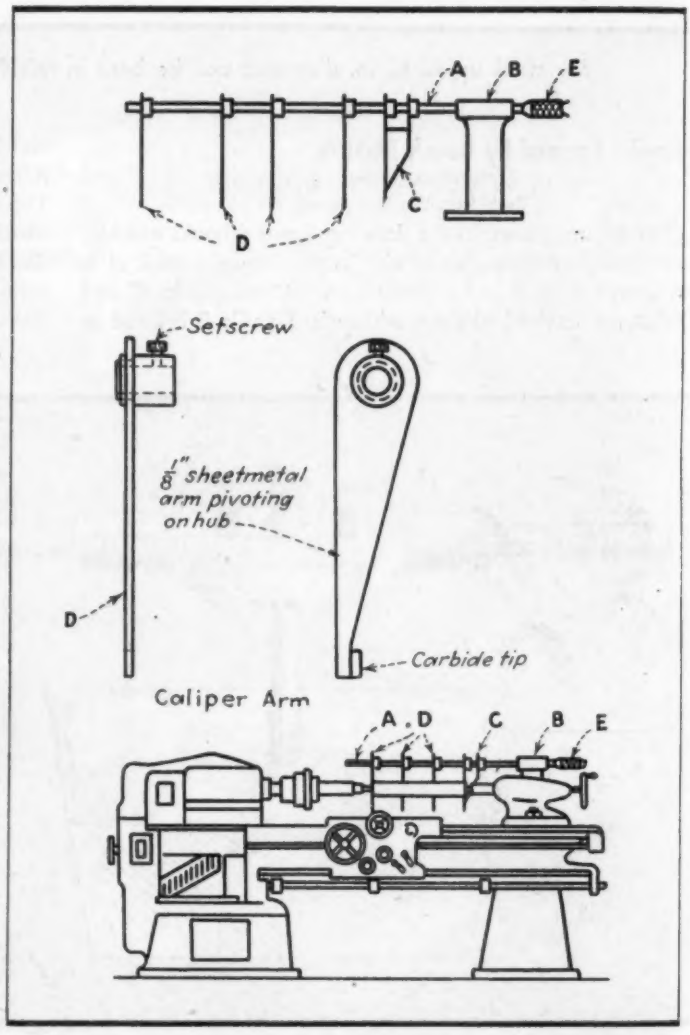
The gage is comprised of base *C* to which it attached V-block *D* for locating the part during inspection. The inside edge of the hook is held by the inspector against small block *E*, while the back edge is held against shoulder *F*. The slot location and its depth are checked while holding the part in this position with the finger. This is accomplished by flush-pin *G* which must register within step *H* if the slot is the correct depth, and enter the slot if it is in the right location. Pin *J* is provided so that the flush pin can be moved readily up and down.

Fixed Caliper Arms for Turning Shouldered Shafts

By ROBERT SMITH
Star Electric Motor Company

We were turning a large quantity of shafts having three shoulders, using high-speed steel tools and no cutting fluid. The location of each shoulder was laid out with chalk and the shafts machined to the layout. Machine practice was changed, including the use of soluble-oil cutting fluid, which precluded the practice of layout out shoulder locations with chalk. As a result, the caliper arrangement shown in the drawing was devised.

Bar *A* is screwed into pedestal bracket *B* which is bolted to the tailstock of the lathe. Set-up arm *C*, pivoting on a hub, is locked to bar *A* with a setscrew when positioned at the point where the bar stock is faced. Caliper arms *D*, each pivoting on a hub, are then located from the set-up arm at points where the shoulders are to be turned. The bar stock is chucked between centers and the set-up arm is placed adjacent to the faced end using adjusting knob *E*, thus locating automatically the position of the caliper arms at the desired shoulder locations. As a shoulder is being machined, the corresponding arm *D* is swung about its hub so that it rests on the revolving shaft. This method eliminates laying out each shaft, thereby speeding operations on this production job. *War Winning Suggestions from the Board for Individual Awards, War Production Drive.*



Caliper arms that swing on a shaft above work being turned to several diameters permit accurate location of shoulders in minimum time

After having been assembled and tack-welded in a special fixture, the top carriage unit is clamped to a Model 60 Cullen Friestadt motor-driven welding positioner, with pushbutton control, so the part can be rotated in such a way that all joints are welded down-hand

Special Welding and Machining Fixtures Used on 90-mm. Anti-Aircraft Gun Mounts

BY J. R. MILLER, Works Manager, Link-Belt Ordnance Company

WELDED ASSEMBLIES comprise the basic components of carriages for 90-mm. anti-aircraft guns, as produced in a plant of the Link-Belt Ordnance Company. Special features and a breakdown of major components into a number of smaller subassemblies has enabled this plant to reduce production time, achieve required accuracies and still provide carriages which can withstand the hard usage which comes from hauling these guns, speedily, over any kind of terrain.

That the required accuracy is provided in the mounts is substantiated by a statement made by Maj. Gen. Levin H. Campbell, Chief of Army Ordnance, less than a year ago. Gen. Campbell said then that American anti-aircraft gunners were bringing down an enemy plane for every 90 shots, whereas during the First World War it required 17,000 shots for each plane destroyed.

Main weldments of the carriage consist of the pedestal, which forms the frame of the carriage unit; a front and rear bogie for the wheels; a top carriage unit and four folding outrigger assemblies. The latter are spread out from the pedestal to add stability to the unit when in firing position.

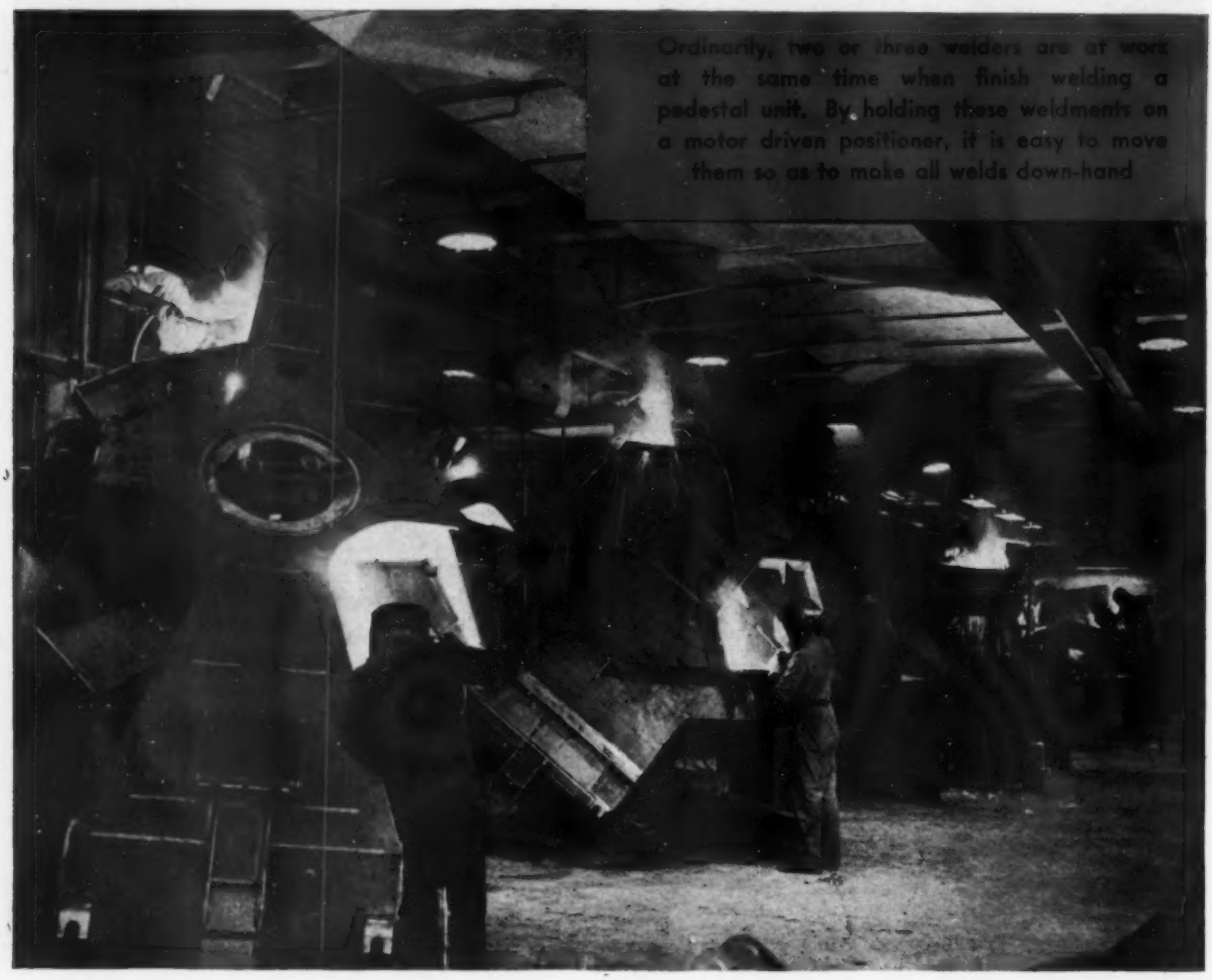
The amount of welding necessary in the manufacture of a carriage assembly for a 90-mm. anti-aircraft gun is indicated, to some extent, by the data in the

Breakdown of major assemblies into small components and the preparation of complete work instruction cards simplifies production of gun carriages

accompanying table. While this table shows the number of parts and amount of welding required for only four of the welded assemblies, it covers the principal welding operations performed in the Link-Belt Ordnance Company's plant. Most of the other weldments are made by subcontracting plants. Procedures have been analyzed carefully for each operation on a subassembly for a weldment, and the final assembly itself. From the operation procedure sheets, Link-Belt production engineers have prepared an operation instruction card for each job. This has simplified the problem of training welders and insures against improperly made welds while minimizing distortion normally caused by improper sequence of welding on some of the assemblies. Operation cards are designed so they can be used for both welding and machining operations. The face of the card carries welding information and the reverse side has the necessary data for machining operations.

When starting production in the plant making 90-mm. gun carriages, it was found necessary to train all of the welders and machine operators. None of them had previous experience in these fields. The men and women employed for production operations were selected by aptitude tests and personal interviews, and then each was given special training designed especially to fit the operations assigned. Proof of the efficiency of this training program lies in the fact that most welders were trained in six weeks, or less, to pass U. S. Army certification tests.

Wherever possible, the main welded assemblies are broken down into a number of subassemblies for welding. For example, 38 subassemblies are made up from the various individual pieces that go into the pedestal weldment before they finally are joined together to form the complete unit. Individual pieces for the various weldments are cut from plate stock with large shears, when the parts have straight edges, or with one of several three-torch Type RS-8 flame cutting machines. Each of these units has an auto-

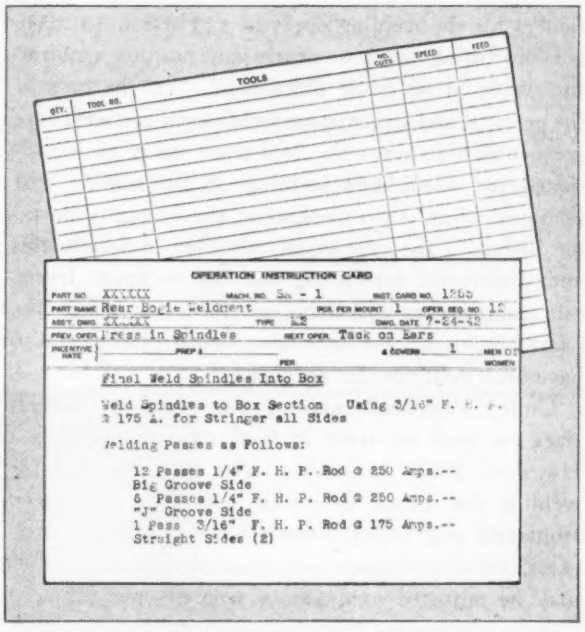


Ordinarily, two or three welders are at work at the same time when finish welding a pedestal unit. By holding these weldments on a motor driven positioner, it is easy to move them so as to make all welds down-hand

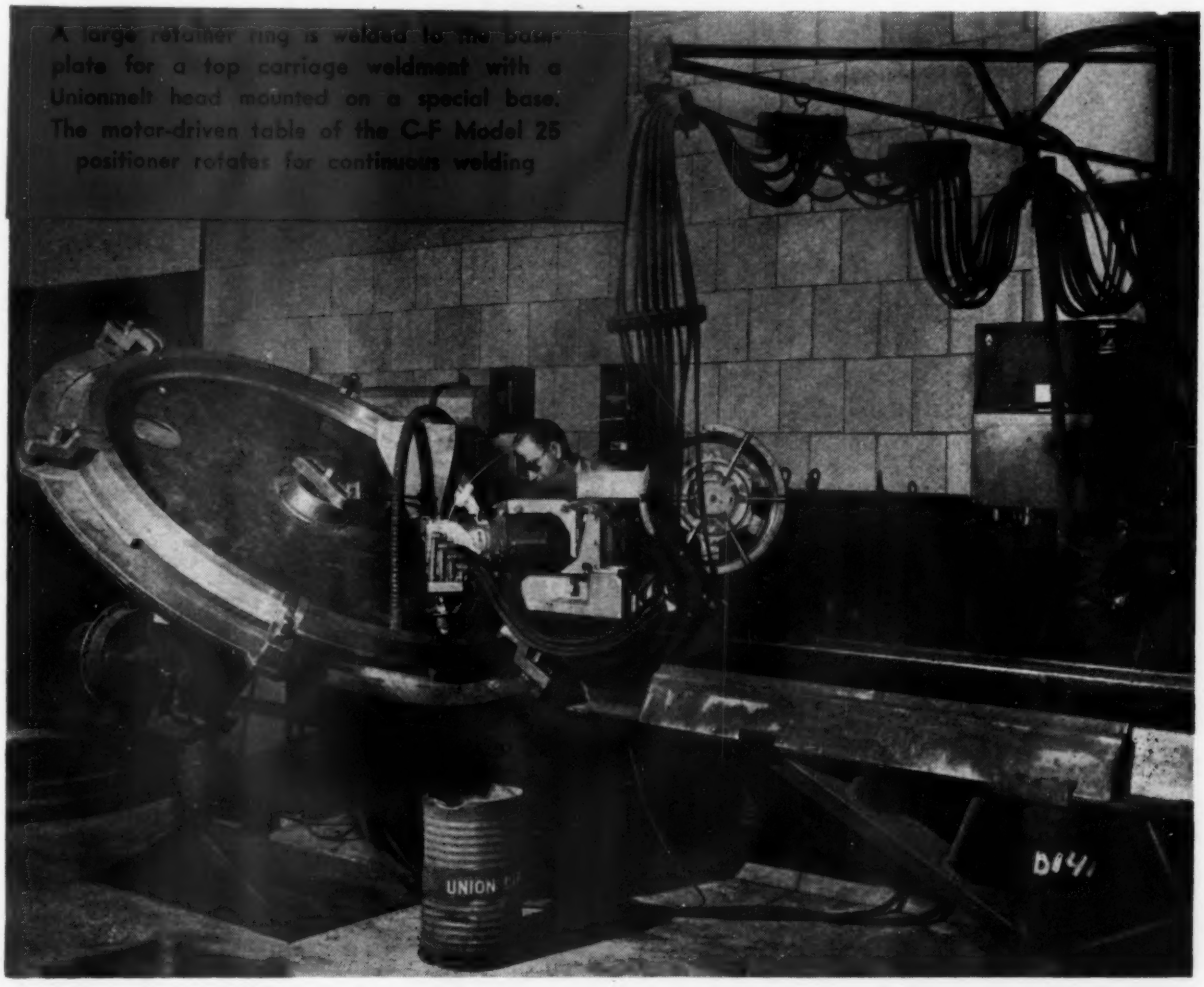
matic tracer head for following the periphery of a templet so that one, two or three parts can be cut to shape with but little attention from the operator, once the proper set-up has been made.

Wherever possible, parts which make up a sub- or final assembly of a weldment, are assembled in special tack-welding fixtures. These fixtures are designed to align parts accurately and hold them in position. Particular attention is given to design of fixtures in order that the operator easily can position his electrode for tack welding. All welds are made with 300 or 500 amp. transformer-type arc welding units, except the welding of the large retainer ring to the baseplate of the top carriage unit. This operation is performed with a standard Unionmelt head supported on a special adjustable jib unit while the two parts are positioned and clamped on the tilted table of a positioner, having a variable-speed motor drive to rotate the table. The Unionmelt head lays a ¼-in. bead around the periphery of the 61-in. diameter weld seam with a 5/32-in. uncoated wire electrode at a rate of about 16 in. per min.

After tack-welding operations have been completed, most sub- and final assemblies are transferred to posi-



Operation instruction cards are prepared in detail for all parts of the 90-mm. anti-aircraft gun mount. Tools and operating data for machining cuts are tabulated on the back of the card



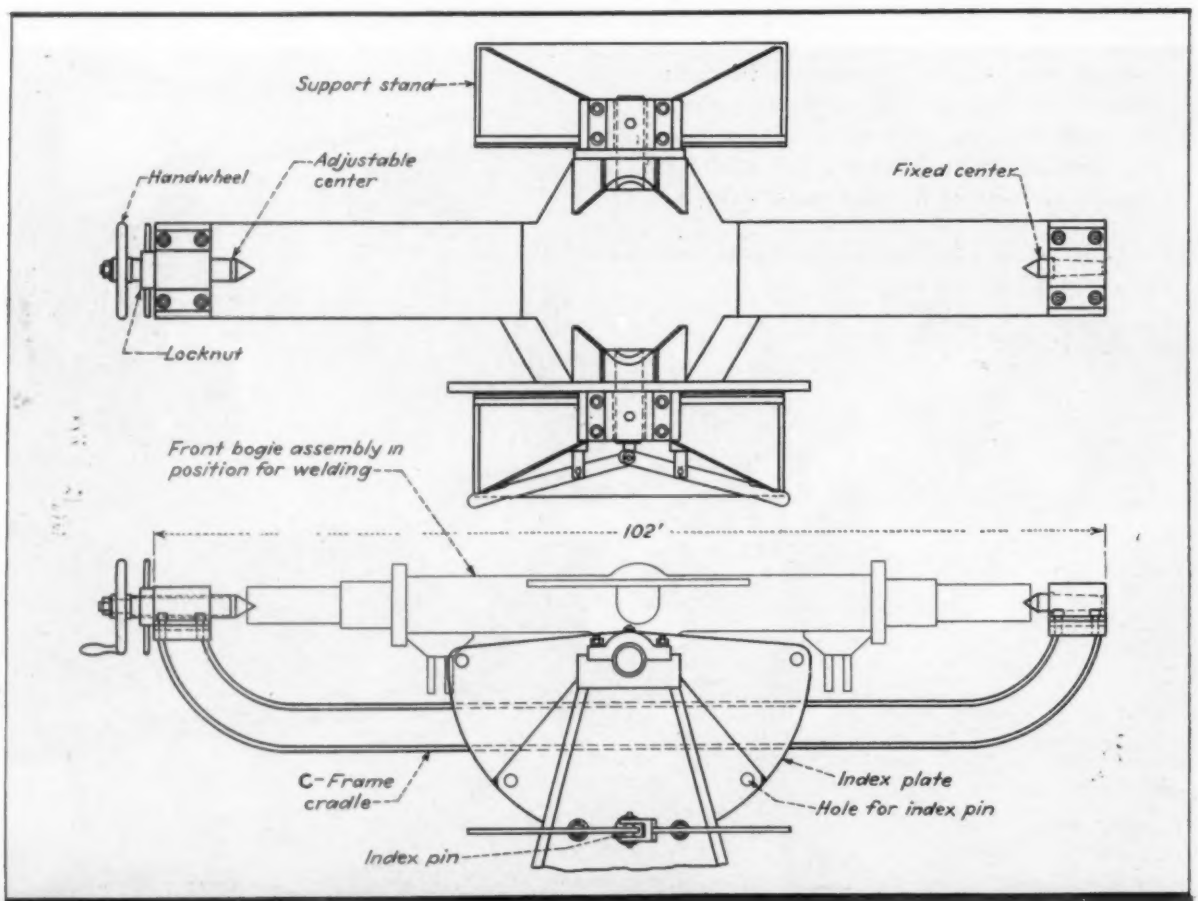
A large retainer ring is welded to the baseplate for a top carriage weldment with a Unionmelt head mounted on a special base. The motor-driven table of the C-F Model 25 positioner rotates for continuous welding

tioners for the welding operations. These units make possible tilting work to nearly any position required for welds to be made down-hand. In the case of the pedestal and top carriage weldments, the welds are frequently high above the floor when the work is positioned for down-hand welding of the seams. For operator safety when working at these heights, portable lifters, of the type commonly used in warehouses and stockrooms for lifting material to upper levels, are employed as adjustable platforms on which the operators stand. In some cases, wood platforms also have been built for this purpose.

Cullen Friedstadt welding positioners of various sizes are used for most of final welding operations. However, special positioners have been designed for welding the spindle extensions into each end of the front and rear bogies. Developed by Link-Belt engineers, these positioners are counterbalanced, so they may be adjusted easily by a woman operator, and work can be rotated about its horizontal axis for welding seams joining the spindle extensions to the bogie bodies.

After welding has been completed, all weldments are stress relieved in a car-bottom-type recirculating furnace, which has capacity for a 12,000 lb. charge. These gas-fired furnaces have automatic temperature control. The front and rear bogie boxes are stress relieved before the spindle extensions are welded in place. After the first furnace cycle has been completed, the units are cleaned by shortblasting and machined for spindle fits. After spindles have been assembled in place and joining welds have been made, the bogies are returned to stress relieving furnaces for another heating cycle. The first stress relieving operation on the bogie boxes, and the single stress relieving operation on the top carriages and the pedestals consists of holding the units at a temperature of 1160 to 1200 F. for about 3 hr. During the final heating cycle on the bogies they are held at a temperature of about 1060 to 1075 F. for 4 to 4½ hr. In both cases, there is a total cycle time of 16 hr. while the parts are in the furnace being heated, held at temperature and cooled.

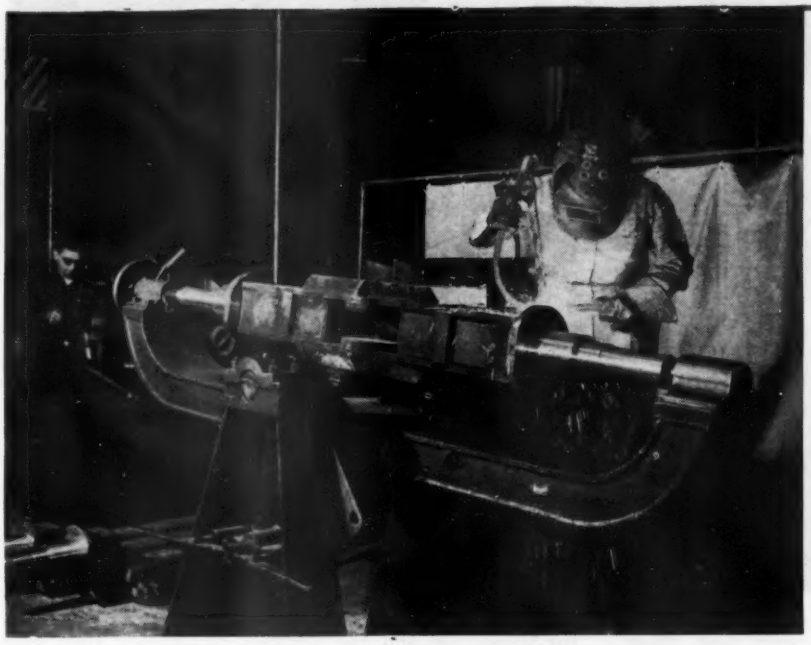
After stress-relieving, all welded assemblies are



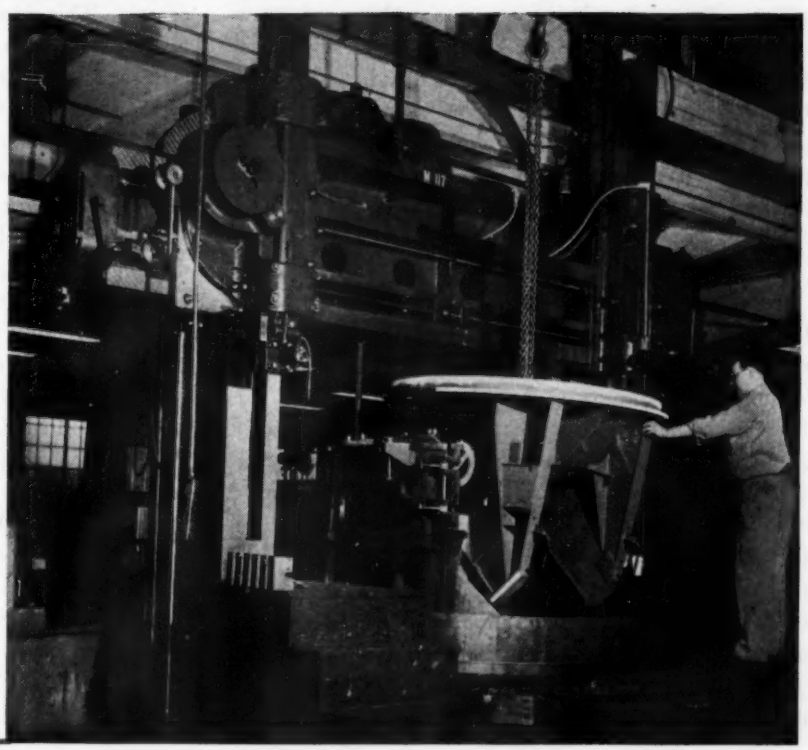
This special welding fixture was designed for positioning front bogie assemblies when welding the spindle extensions at each end of the welded box.

WELDMENTS FOR 90-MM. GUN CARRIAGES

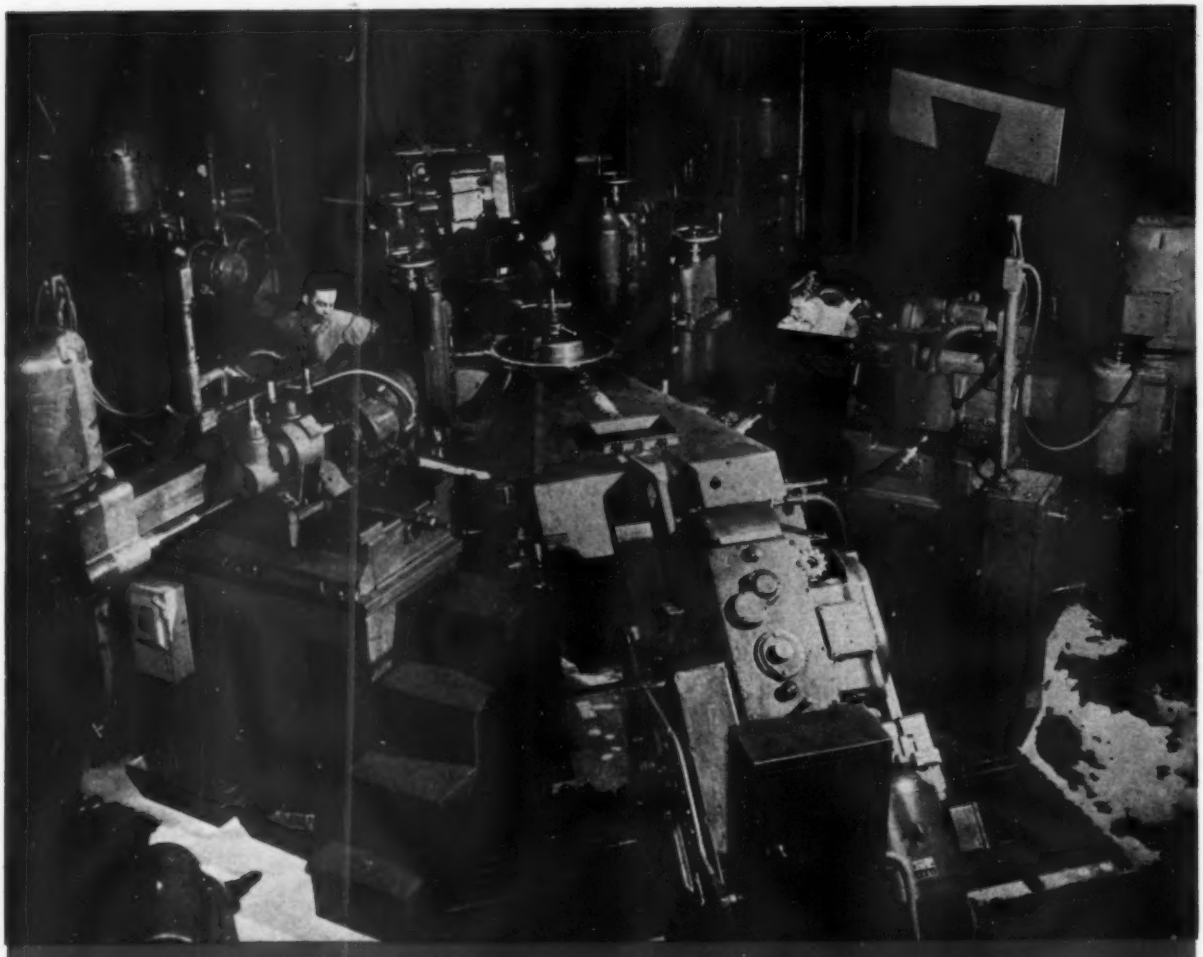
Weldment	Number of Individual Pieces	Number of Subassemblies Made Up	Total Inches of Welding	Total Weight of Assembly as Welded (Pounds)
Pedestal	187	38	6,550	3,100
Top Carriage	129	27	3,402	1,820
Front Bogie	41	8	720	697
Rear Bogie	28	6	802	731



The welding fixture for the front bogie positions the work conveniently, and can be operated easily by a woman



The operator of this 100-in. Betts boring mill is shown positioning a top carriage weldment into a heavy fixture for the first machining operation on this part



This special machine unit has eight milling heads and one boring head for operations on the pedestal weldment. Each machining unit is independently operated

cleaned by shotblasting with steel grit, and those which require X-ray inspection are delivered to a separate laboratory where a 250 kv. unit is suspended from a jib crane arrangement so the head can be positioned as required over one of the large units. Before delivery to the machine shop, all of the weldments are primed with a coat of paint in one of several water-curtain type paint spray booths.

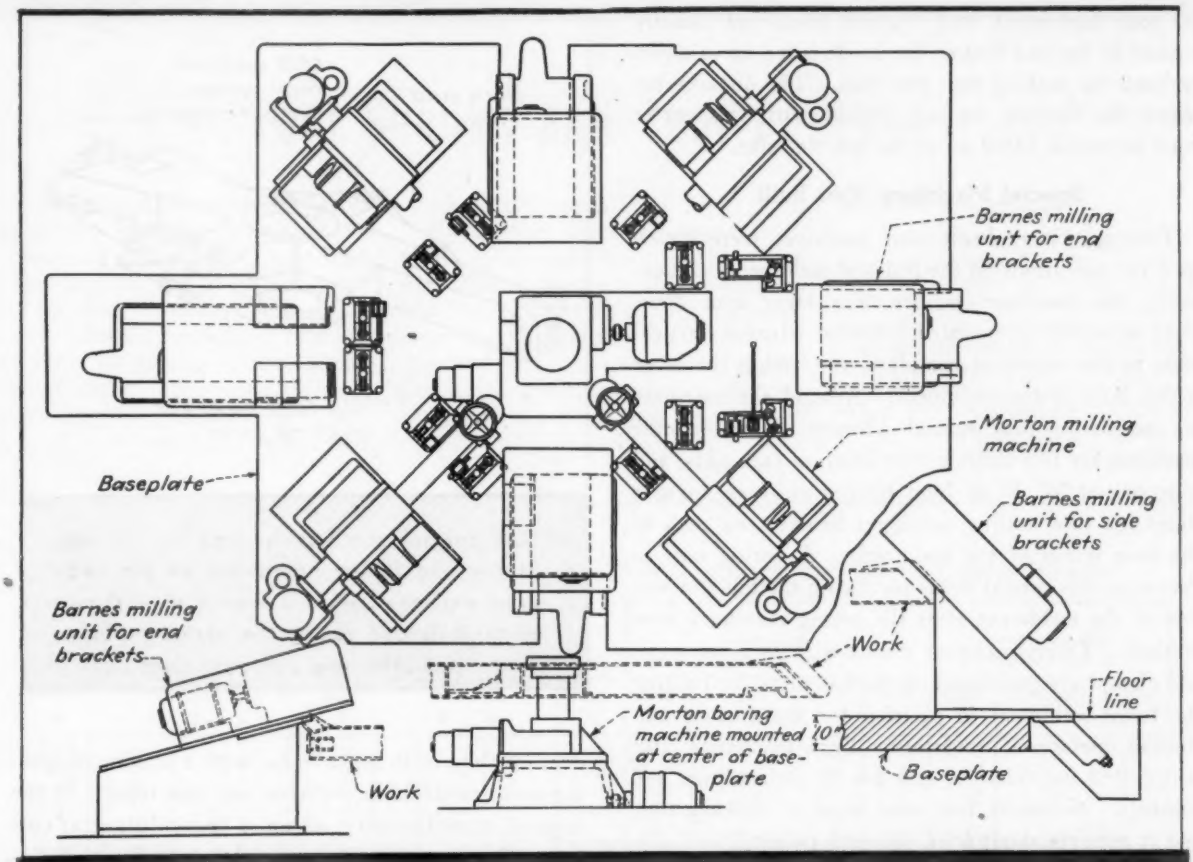
Special Machining Fixtures Built

It was necessary to design and build a number of large and very accurate fixtures for machining weldments that go into the assembly of a carriage for the 90-mm. anti-aircraft gun. Large machines are required for operations on the top carriages and the pedestal, as well as on the large cast steel leveling bearing, in which a ball socket must be machined within precision limits. A 100-in. Betts boring mill, for example, is used for turning, boring and facing the flange on the baseplate of the top carriage, and 78-in. fixed-crossrail type Betts boring mills are employed for operations on the leveling casting.

Weldments and castings delivered to the machine department go to one of several large layout plates for inspection and the scribing of location lines and centers. This procedure insures that the time is not wasted in machining parts that are not made properly, and also makes it possible to adjust the layout so that all surfaces will clean up in machining.

A number of horizontal boring mills are employed for facing pads on the top carriage weldment and for drilling and boring a number of holes in these units. Some of these holes are tapped. Ordinarily, milling, drilling, boring and tapping operations would be performed on one machine, but production quantities justified dividing the operations among three horizontal mills so that each individual set-up could be simplified as much as possible. In one set-up 21 pad surfaces are milled, and four holes are drilled and tapped. A 39-deg. angular head carries a 12-in. diameter inserted-tooth cutter for milling pads at the top of the units, while a right-angle head is used for milling top surfaces of pads on the baseplate. Each of the horizontal-mill fixtures is mounted on a standard rotary table, and each fixture carries hardened steel plates for quickly locating the milling cutters for various operations.

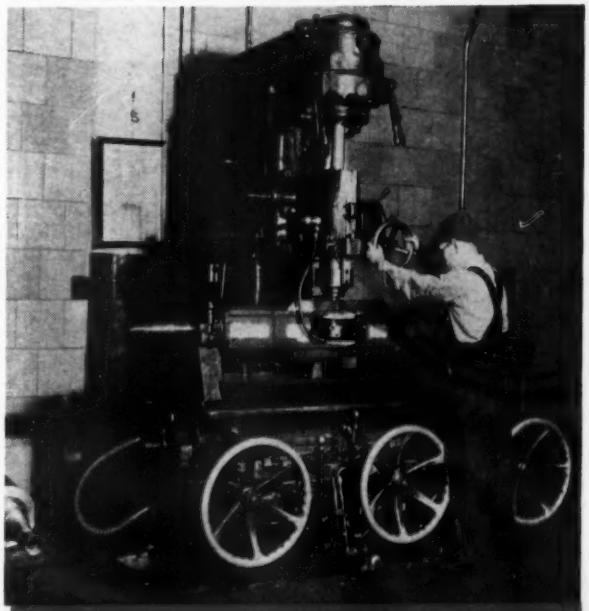
On a 6-ft. radial drill, a simple fixture supports the



Nine special machining units for the pedestal weldment are mounted on a large steel baseplate. Work is supported on cast-iron pedestals, each of which has locating gages, leveling jacks and clamps

top carriage in an inverted position for drilling and tapping operations in the bottom of the baseplate, while a tilting fixture is used for operations on the top of the unit. A large faceplate on this fixture can be indexed, and the table tilted to any required angle. Set-up men position and clamp a top carriage unit in one of the fixtures while the drill press operator is working on another unit set up in another fixture. When the operator completes necessary operations on a unit, he swings the head of the drill press over to the other fixture, and set-up men remove the finished piece and replace it. The base of the fixture can be rotated about its vertical axis, so it is not necessary to move the drill when set up for drilling succeeding holes around the skirt and flange ring on the bottom of the top carriage unit.

A vertical miller is used for machining the draft-spindle fit in a front bogie weldment. These draft-spindle units are finished on spindle extensions in a number of lathe and cylindrical grinder operations before delivery to milling machines for finishing operations. In one milling operation a large 8¾ in. diameter inserted-blade cutter mills the top and bottom surfaces in the draw bar fit. This special cutter



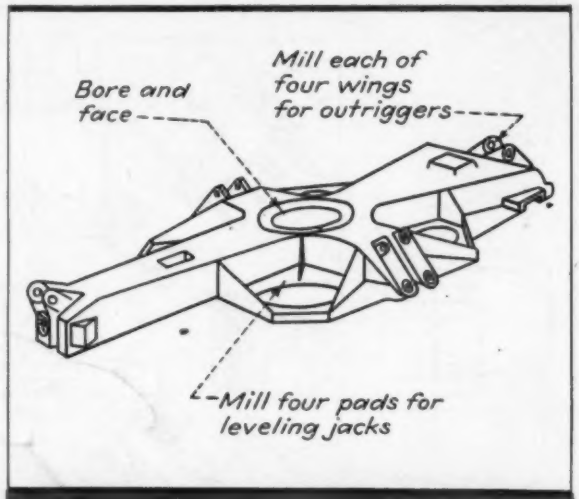
A Reed-Prentice No. 5 vertical miller is used for machining the draw-bar fit in the front bogie unit. Special Davis cutter has four high-speed blades in each face

has four high-speed steel inserted blades set radially around its top and bottom faces. It is fed up or down by hand for making the two cuts. The distance between the finished surfaces milled with this cutter must be within 0.010 in. of the specified size.

Special Machines Also Built

Two special multiple-head machines were developed for operations on the pedestal weldment. Essentially, this machine consists of a large iron floorplate on which is mounted a special Morton vertical unit, at the center of the plate, for boring the large center hole in the weldment. Around the baseplate are positioned four special Morton vertical-spindle machines for face milling four leveling jack pads, and four special W. F. & John Barnes units on angular slides for face milling outrigger brackets on each of the four wings of the weldment. A boring unit in the center has special heads for facing the top and bottom of the weldment after the boring cuts have been finished. Twelve support stands with locating gages and clamps are positioned on the baseplate for holding the large weldment in position for the various machining operations performed. Each machining unit is operated individually, and has its own motors and controls. Normally four men work at this machine, and it requires about 6 hr. for each pedestal.

Considerable care is taken to insure accuracy of the internal traversing gear which is bolted to the top carriage for rotating the gun about a vertical axle. This is a 128-tooth internal gear with a 51.200-in. basic pitch diameter and a 3-in. face. The 2.5 D.P., 14½ deg. involute teeth must be cut with a maximum spacing error of 0.002 in. between any two teeth. In the original manufacturing set-up, a heavy-duty gear cutter with a special head was used for cutting these internal teeth. However, the time for cutting the 128 teeth has been reduced from 20 hr. to 10 hr. by rough broaching the teeth on a special machine developed by the American Broach & Machine Company and finishing on the gear cutter. In this machine, the vertical broach slide carries three broaching cutters. About half the material between two teeth is removed with the first cutter, while the semi-finishing cutter removes material to the full depth of the next tooth and leaves about 0.005-in. of material on each side of the tooth profile for removal by the finishing broach cutting in the next tooth space. The 60-in. long broach bars are traversed through the work at about 12 ft. per min. At the end of the cutting stroke, the broaching slide is moved about ¾ in. away from the work before it is returned to the upper position. The table is indexed automatically, one tooth space, while the broach slide is being returned. These traversing gears are made from forged steel rings having a Brinell hardness of 220 to 260. A heavy-duty cutting oil having a high sulphur content is flooded over the work in front of the broaches during each cutting stroke.



One special machine is used for milling, boring and facing operations on the pedestal weldment, while a second special machine drills and reams the necessary holes for attaching outrigger arms

Considerable time is saved by rough broaching teeth in the transversing gear for the 90-mm. anti-aircraft gun mount and then finishing on a special G.&E. gear cutter

Care in machining and welding has speeded output of these carriages and made possible the accuracy which has resulted in the fine record of 90-mm. anti-aircraft guns in action. Time spent in designing and building special fixtures and machines has been repaid many times over in satisfactory work.

Tool Shanks and Tool Posts—I

THIS STANDARD, approved November 1943 by the American Standards Association, is a revision of "The American Standard for Tool Holder Shanks and Tool Post Openings," issued in 1929. Besides the change in title (to cover items for lathes, planers, boring mills and turret lathes) the revisions include: improved nomenclature; new lists of sizes of square and rectangular shanks; the covering of high speed steel, stellite and cemented-carbide tools; preferred sizes of bits and shanks of toolholders; and dimensions and forms of corresponding toolposts. Sponsor organizations for the revised standard are: American Society of Mechanical Engineers, National Machine Tool Builders Association and the Society of Automotive Engineers.

Scope of the Standard

Details standardized include: (1) terminology and definitions; (2) corresponding tool-post openings and recess; (3) simplification of list of preferred sizes of toolbits, toolholders, and tool shanks, including tools made of high-speed steel, stellite, and hard-faced tools tipped with carbide; and (4) cross sections and lengths of shanks of square and rectangular single-point tools used in lathes, planers, shapers, boring mills, and similar machine tools.

Table 1 Dimensions of Tool Shanks, Tool-Post Openings, and Lathe Center Height

Shank Section Figs. 1, 2, 4, and 5			Lathe Opening Figs. 1, 3, 4, and 5			Planer and Shaper Opening Figs. 1, 2, and 5			Lathe Center Height Figs. 1 and 3		
Max w	Nominal w × h	Max h	Min B	Nominal B × D	Min D	Min B	Nominal B × E	Min E	Max C	Nominal C	Min C
0.40	* 3/8 × 3/4	0.85	0.49	1/2 × 1 3/8	1.27	0.49	1/2 × 1 1/16	1.04	0.93	7/8	0.85
0.48	7/16 × 7/8	0.99	0.57	9/16 × 1 1/2	1.48	0.57	9/16 × 1 1/4	1.19	1.09	1	0.99
0.56	* 1/2 × 1	1.15	0.68	11/16 × 1 3/4	1.72	0.68	11/16 × 1 7/16	1.38	1.26	1 3/16	1.15
0.67	* 5/8 × 1 1/4	1.34	0.81	13/16 × 2	2.00	0.81	13/16 × 1 5/8	1.61	1.47	1 3/8	1.34
0.80	* 3/4 × 1 1/2	1.56	0.96	1 × 2 3/8	2.34	0.96	1 × 1 7/8	1.87	1.72	1 9/16	1.56
0.95	† 7/8 × 1 3/4	1.81	1.14	1 3/16 × 2 3/4	2.71	1.14	1 3/16 × 2 3/16	2.17	1.99	1 13/16	1.81
1.13	*1 × 2	2.11	1.35	1 3/8 × 3 1/8	3.16	1.35	1 3/8 × 2 9/16	2.53	2.32	2 1/8	2.11
1.34	†1 1/4 × 2 1/4	2.43	1.61	1 5/8 × 3 11/16	3.65	1.61	1 5/8 × 3	2.92	2.67	2 7/16	2.43
1.60	†1 1/2 × 2 3/4	2.86	1.91	1 7/8 × 4 1/4	4.29	1.91	1 7/8 × 3 7/16	3.43	3.15	2 7/8	2.86

All dimensions are given in inches.

* Size listed in Table 3.
† Size listed in Table 4.

Table 2 Length of Flat, of Square Tools for the Sections Indicated

Cross Section[1] Square	Length, *l*	
	Solid Tools (S)[2]	Tipped Tools (T)[3]
3/16	2	....
1/4	2 1/2	2 1/4
5/16	2 1/2	2 1/4
3/8	3	2 1/2
1/2	4	3 1/2
5/8	4 1/2	4
3/4	6	4 1/2
1	7	7
1 1/4	8	7
1 1/2	10	9

All dimensions are given in inches.

[1] All other lengths for standard square tools are considered special.
[2] Solid tools include such tools where the full section cutting end only of the full shank section consists of metal-cutting material.
[3] Tipped tools are those where a relatively small piece of metal-cutting material is attached to the tool shank.

Table 3 Length of Flat, of Rectangular Tools for the Sections Indicated

Cross Section	Length, *l*	
	Solid Tools (S)[1]	Tipped Tools (T)[1]
1/4 × 1/2	4	...
5/16 × 5/8	4 1/2	...
*3/8 × 3/4	5	...
1/2 × 3/4	5 1/4	5 1/4
*1/2 × 1	†5 1/2 or 7	†5 1/2 or 7
*5/8 × 1 1/4	†6 1/2 or 8	†6 1/2 or 8
*3/4 × 1 1/2	†6 1/2 or 9	†6 1/2 or 9
1 × 1 1/2	10	10
*1 × 2	12	12
1 1/2 × 2	...	†9 or 14

All dimensions are given in inches.

[1] See footnotes of Table 2 for definition of solid and tipped tools.
* These sizes are given in Table 1.
† Shorter lengths normally for turret lathes, boring mills, etc.

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Fine finish is necessary to provide maximum accuracy—reduce wear and improve wringing. Webber Gage Blocks are given the finest finish commercially possible to put on steel.

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Gage blocks must be able to stand up under normal usage without showing excessive wear. Performance records prove that Webber Gage Blocks have exceptional "wearing quality."

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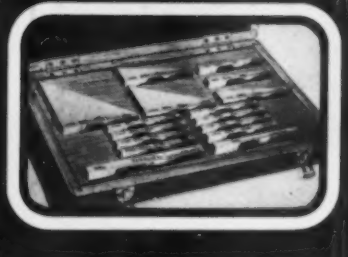
Set No. 38A—(Thin Blocks) $195.00
Set No. 38B—(Thin Blocks) $155.00
Set No. 14A—(Angle Blocks) $450.00



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Tool Shanks and Tool Posts—II

Terminology and Definitions

Single-Point Tool. A single-point tool for turning, planing, and shaping consists of a shank and point. The point may be integral with the shank, tipped with hard metal, or consist of interchangeable bits of cutting material attached to the end of the shank, Fig. 1.

Toolholder. A toolholder is a device for holding a cutting tool in a definite position with respect to the toolslide of a machine tool. Some holders are provided with a means for adjusting the tool point with respect to the centerline of the work, while others require the use of shims or parallels.

Single-Screw Toolpost. The single-screw toolpost as used in most small lathes, Fig. 1, shapers, Fig. 2, and some light planers, consists of a screw, a round post and a base.

Toolpost Screw. The toolpost screw is fitted in the post. It allows for tool shanks of various sizes, and furnishes the means for clamping.

Lathe Toolpost. The lathe toolpost carries the screw at one end and an integral circular flange at the other. This flange is recessed in the bottom of a T-nut fitted into the T-slot of the lathe tool rest, Fig. 1.

Lathe Toolpost Collar. The lathe toolpost collar is usually a circular ring fitted about the base of the post. It is sometimes a ring with diametrally spaced steps on the upper face, on which the tool rests. The steps furnish a means for vertical adjustment of the tool point.

Toolpost Ring Collar. The toolpost ring collar also may consist of a ring provided with a circular seat on the upper face, into which is fitted a rocker base.

Rocker Base. The rocker base, Fig. 1, is that part which fits into the circular seat of the toolpost collar. It supports the tool and furnishes a means of adjusting the height of the tool point. (Shims also are used for this purpose, Fig. 4.)

Shaper Toolpost Circular Flange. The shaper toolpost circular flange, Fig. 2, is recessed into the back face of the clapper and passes through the clapper and a serrated tool base plate mounted on the face of the clapper.

Screw Plate. A screw plate is frequently provided for use between the screw and tool shank to distribute the pressure and to prevent damage to the shank, Fig. 2.

See standard on terminology of single-point cutting tools, ASA B5.1⅓—1939.

(*To be continued in an early number*)

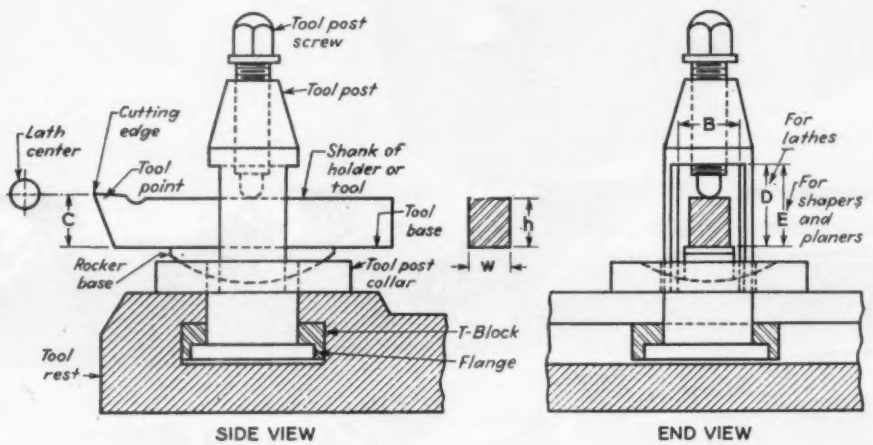

Fig. 1 — Single-screw toolpost with rocker base

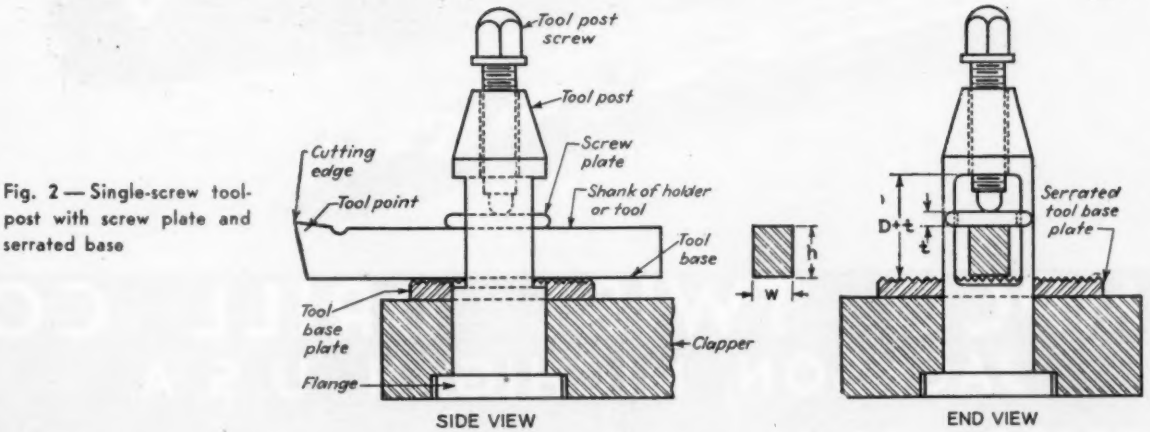

Fig. 2 — Single-screw toolpost with screw plate and serrated base

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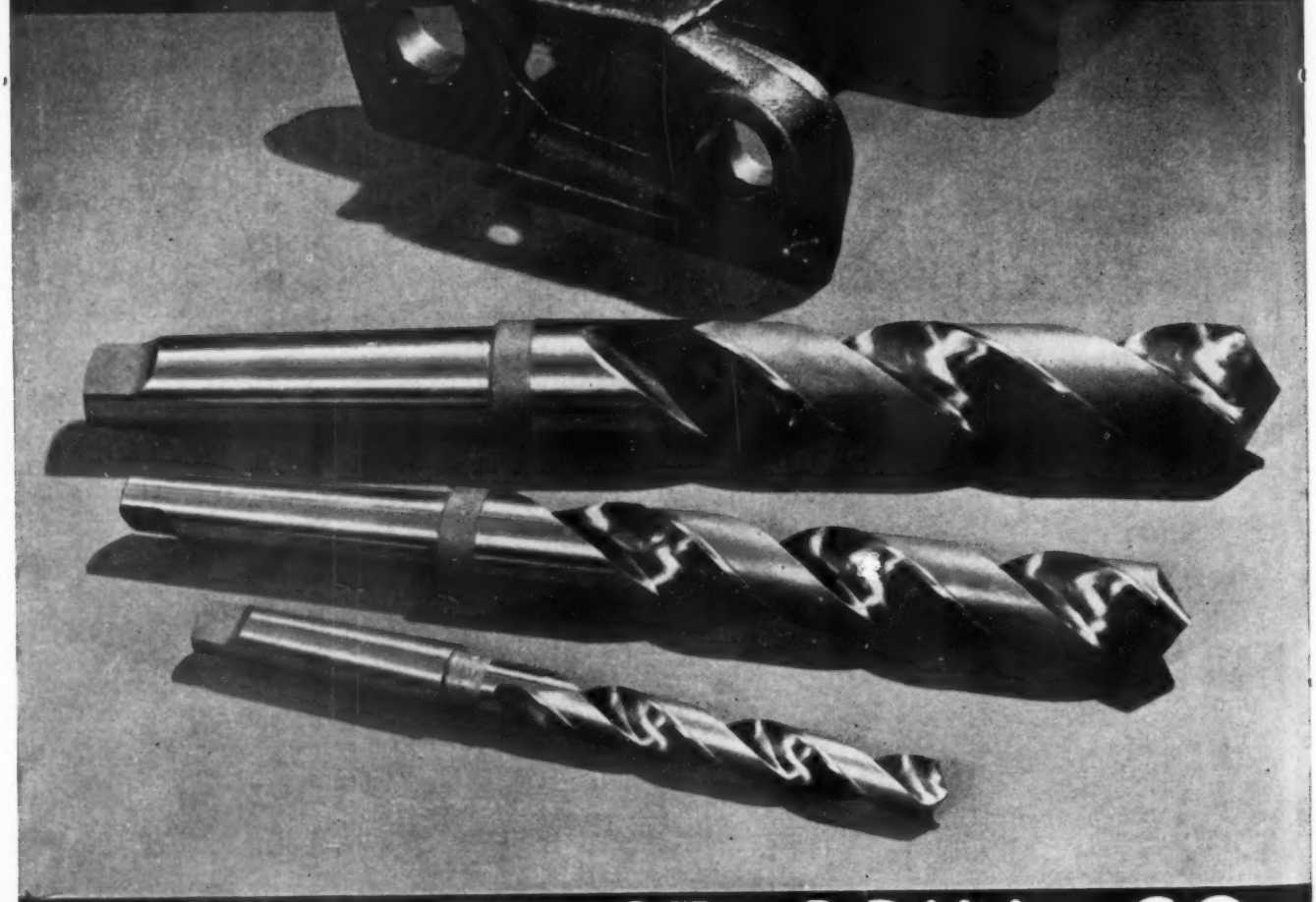

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Tool Orders Rise

There has been an upsurge in machine tool orders the past few weeks that has resulted in the largest bookings thus far this year. The sharp increase has come from new plane engine programs and from Russian buying. A considerable number of machine tools are also required for a new top-priority production program just in its initial stages—manufacture of heavy artillery guns. The use of such guns is rapidly coming into prominence and the urgency rating of these guns has been put up alongside invasion barges as No. 1 item. The demand for machine tools for plane engine plants arises from the change-over to larger size engines. Most of the conversion is in plants of automobile makers. Russia is in the midst of placing big lend-lease orders for machine tools apparently to be employed in rebuilding plants destroyed by the Germans and in establishing new war-producing facilities.

Will Temper the Drop

Machine tool production has been pursuing a steadily declining course for many months, and it is possible that the upspurt in business may arrest the downward trend momentarily. It apears improbable, however, that operations will be stabilized at present levels. They are likely to go still lower. The situation in the industry is extremely spotty. In view of the losses of men to the armed services, many companies have all the work that they can do for months ahead. Others say that their backlogs are relatively slim. In at least a few cases, builders may have to turn down some machine tool orders because the manpower shortage makes it impossible to get more help and they have a substantial amount of direct war work that they must carry through with.

No Retooling Relaxation

Bookings for the next few months depend pretty much upon the attitude assumed by the War Production Board toward machine tools. Aside from the actual shifts in war needs, which may bring forth unexpectedly and at any time a sudden new program for which tools are required, demand will be regulated by the strictness or laxity of WPB in approving machine tool orders requested by war contractors. There is no sign of a relaxation of the current rule for fine screening of all orders. The time still seems far distant when WPB will permit machine tool companies to fill orders for machine tools for retooling of plants for civilian production. Tentative orders have been given by certain automobile companies to individual machine tool builders, but they are merely being filed as priorities cannot be secured to proceed to build them. The machine tool industry now has a considerable volume of direct war work.

War Expenditures Up

War expenditures by the government attained an all-time high in March, totaling $7,808,000,000. Production is holding up to the volume that has prevailed all year. Rapid switches and cutbacks are being made here and there as war requirements change. New contracts are being placed too, particularly in emergency programs that must be speeded up to meet revised schedules. Aircraft is believed to be keeping up to the peak reached last month. Component parts are causing somewhat less anxiety than a few weeks ago, though bearings continue to be one of the hottest spots. Steel operations are down to 98 percent, but plates and sheets are tighter than ever. Shell steel is coming back into prominence as shell schedules are stepped up. Raw materials are available in sufficient quantities that no war program is being delayed. With the exception of some strip, demands on the mills for brass wire are greater than ever before and copper will be tight for the duration.

Manpower Balks Reconversion

Reconversion to civilian goods manufacture is progressing very slowly, because manpower is not at hand to use for other purposes than war production itself. It appears likely that no more than 200,000 electric irons, instead of 2,000,000, may be made this year, despite the earlier order to proceed on the larger scale. Most of the iron manufacturers are in critical war production areas. The only possibility of new passenger automobiles being made in 1943 is a release that may come through late in the year for 200,000 units to be produced by one company, the order being handled by Defense Plant Corporation.

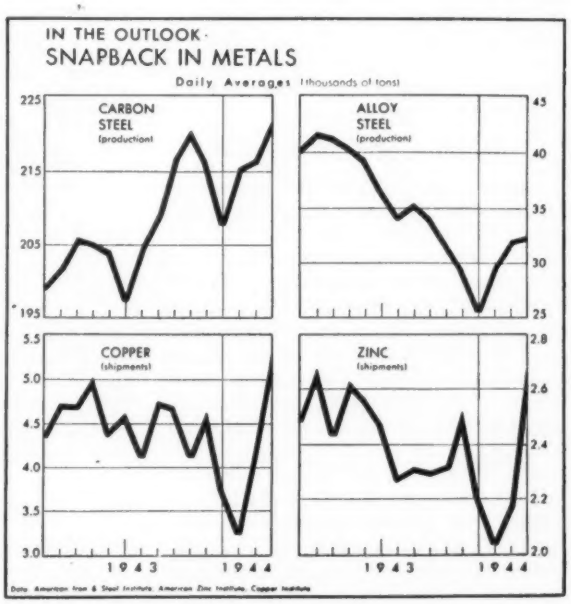
NOTICE

The signed editorial that has heretofore appeared in this position will be found on page 87 of this issue. In the future the editorial will be similarly located.

Russia Books Postwar Orders

Individual American companies have begun negotiations with the Soviet government for huge orders to be rushed into production just as soon as the war demand slackens. Some 30 companies may book as much as $1,500,000,000 of Russian business during the next six months. Credit will not be a problem. The initial orders will be privately financed, with one concern already extending $250,000,000 of credit to the Soviet government. A second company has offered $100,000,000 in credit. Accompanying the new orders will be contracts for U. S. technical specialists to supervise installations in Russia. Emphasis will be on chemicals in Moscow's first post-war five-year plan. Consumer goods will have a place in the program too.

Seasons and Components — Production and shipments of key metals has been boosted since the first of the year by increased military demands, following declines resulting from component shifts. For instance, zinc, copper and alloy steel are now going into more artillery shells. New types of guns are taking more steel tube, pipe, bars; landing ships are consuming more plates and shapes; and more rail made for carriers



Prepare Surplus Disposal Bill Drawn from Others Pending

Leading features of the nearly fifty surplus disposal bills now on the Congressional docket are being incorporated in one measure; revising machine tool bill according to memo

WASHINGTON—The best features of the executive order which set up the office of the Surplus War Property Administrator, and of the various pending surplus disposal measures, are being drawn together in a bill now being prepared by Senator James E. Murray's Small Business Committee and War Contract Subcommittee.

Emphasis is placed on the protection of the little man through:

1. Uniform requirements for wide and general public advertising of availability of items;
2. Smaller War Plants Corporation review of sales lots offered and of credit terms laid down, followed by recommendations of any changes necessary to aid purchase by small business houses;
3. In case the disposal agency chooses not to comply with these recommendations, SWPC would be enabled to purchase surpluses for redisposal in accordance with terms favorable to small business.

Would Aid Schools

Provisions will be included giving priority to educationl institutions and to state and local governments in the disposal of surpluses at reasonable terms.

While not making it mandatory, a proposed provision would allow the disposing agency to give to educational institutions any items originally acquired for educational purposes. It would further allow the presentation to such institutions of any surpluses which could not profitably undergo the expense of storage, handling, advertising and commercial sale. Items of commercial value could be sold at as much as fifty percent discount.

Before Senator Murray introduces this bill, it will go to trade associations for consideration, and hearings probably will be held on it.

To Drop Hill-O'Leary Bill

Apparently scheduled for liquidation is the Hill-O'Leary bill which would set up a surplus property board with executive powers, to make rules and regulations in keeping with prior and subsequent legislation. Its demise seems prompted by an inclination to go along with the filling in of the framework indicated by the executive order which set up the office of the Surplus War Property Administrator.

NMTBA Recommends Changes

Senator James E. Murray's bill for disposal of surplus machine tools is in process of revision with drastic changes indicated. It is understood the bill will be reconstructed substantially in accordance with a lengthy memo the National Machine Tool Builders Association was invited to submit.

House Bill 4009, introduced by Representative Joe Starnes, is considered that body's counterpart of the Murray machine tool disposal bill. It differs, however, in that it was introduced later and incorporates some of the advance thinking generated by conferences on the Murray bill.

Favors Master Program for Reconversion, Readjustment

NEW YORK—Not more than ten percent of the sums estimated as due on terminated war contracts have been paid, said Senator James E. Murray, Montana, speaking before the New York State Society of Certified Public Accountants. He added that legislation is now pending, of which he is co-author, which could remedy this.

He expressed advocacy of congressional enactment of an over-all mobilization and postwar adjustment program, instead of piecemeal reconversion legislation and planning.

"A contract termination bill calls for a companion bill in war sulpluses and the two bills in turn are unthinkable without companion legislation on dismissal wages, retraining and reemployment," he asserted. "It is imperative that we find some adequate provision which will protect all those rendered unemployed during reconversion." He hopes to incorporate in his proposed contract termination bill the results of a study of these problems.

Let Agencies Settle

The settlement of contracts, he insisted, must be left to contracting agencies, under the guidance of policies laid down by Congress. "While the Comptroller General should have the power to stop payments and to recover funds already paid only in case of fraud or illegal payments, I believe that the Comptroller General should be specifically directed to review termination settlements for the purpose of discovering negligent practices and waste of public funds and to report the results of his investigations to the Congress.

Would Pay Costs

The bill which he states will speed termination settlements will include provision for payments for reasonable costs incident to termination and settlement; reasonable costs of removing and storing termination inventories; such allowance for profit on the work done for the terminated part of the contract as is reasonable under the circumstances and interest on termination claims.

Wide World Photo

Formidable Team—The just-disclosed 38-ton high speed military tractor, the M-6, built by Allis-Chalmers' tractor division, teams up with the new 240 mm. howitzer and the 200 mm. gun to increase the threat to the Axis

Submit Reworked Murray Bill Geared to the Baruch Report

WASHINGTON—Senators Walter F. George and James E. Murray have presented Congress with a modified version of the latter's original contract termination bill. The idea now is to hustle the new bill through ahead of the slow-moving legislation that deals with the broader problems involved in the demobilization of the war program.

Details have been modified to bring them into line with the recommendations of Baruch's postwar report. Main features of the bill as it now stands are:

(1) Creation of Director of Contract Settlements who would set general policy in termination, leaving actual operations to the procurement agencies.

(2) Provision for liberal interim financing for contractors while settlements are in the works.

(3) Detailed statement of a contractor's right to clear his plant of government-owned equipment 60 days after termination.

Organize Reconversion Advisory Unit to Aid in Policy Making

WASHINGTON—In its formative stage, with invitations to membership extended and most accepted, is a civilian advisory committee which the War Production Board plans will originate policies of reconversion to peacetime production.

Present plans call for representation on the body of industry, labor, agriculture and consumers. With manufacturers thus placed in the minority, there is understood to be widespread feeling that industry might be better represented on a separate group designed to make its own recommendations and explanations.

The committee will have nine members, but only seven have been named. Of those invited to serve, only one, Robert M. Gaylord, president, National Association of Manufacturers, declined. In a letter to Donald M. Nelson, WPB chairman, he explained his belief "that committees of this nature are ineffective. They cannot adequately represent the different segments of the economy and the problems they have to consider are so complex that it is impossible for them to reach an agreement on anything but very general and relatively unimportant subjects."

While expressing regret that Mr. Gaylord had declined to take part, Mr. Nelson disagreed with his opinions and explained that many problems connected with readjustment and reconversion are of such "a momentous nature" it is imperative that WPB and its chairman have the benefit of opinions from all segments of the economy.

Seven Members Named

The seven members named are Eugene Meyer, editor and publisher, The Washington Post, representing public opinion; Gordon Rentscher, chairman of the board, National City Bank, New York, finance; Eric Johnston, president, Chamber of Commerce of the U. S., representing industry; Philip Murray, president, Congress of Industrial Organizations, and William L. Green, president, American Federation of Labor, for labor; William J. Kelly, president, Kelly O'Leary Steel Works, Chicago, for heavy industry, and Miss Ruth O'Brien of the Bureau of Human Nutrition and Home Economics, Department of Agriculture, representing consumers.

Two members still to be named will speak for agriculture and distribution. The committee, Mr. Nelson says, will meet every three weeks or so. It will have a permanent secretariat and working staff composed in large part of experts from the various industry divisions and the Office of Civilian Requirements.

Will Consider Recommendations

Recommendations made by manufacturers who meet here to consider their reconversion and postwar problems will be made available to the committee at once, Mr. Nelson said. At the same time copies of the recommendations will be made available to the press. "We are going to operate this readjustment and reconversion program in a 'goldfish bowl' so far as the public is concerned," he said. "Everyone in the country has a stake in the decisions that are made and should be completely informed on suggestions that are advanced and of the final decisions made."

Mr. Nelson made it clear that he intends to make the decisions on reconversions, but, at the same time wants to have the benefit of the advice of the committee so that the conclusions he reaches will represent a rounded appraisal of the problem.

Telescope Checker—A woman ordnance inspector checks one of the telescopes being made at the Westinghouse Electric Appliance plant, Mansfield, Ohio. Peering through the instruments while aiming them at a bright light, she looks for dirt or moisture on the lens and checks the aiming scale marked on a glass reticle. These telescopes have a range of almost two miles

To Sift Subcontracts

WASHINGTON — The War Department has begun a campaign to eliminate excess profits from work done by subcontractors under prime contractors.

Heretofore, the subcontractor has had a unique position in this contract picture. It is not implied by the War Department that all subcontractors are profiteering, but the point is made that if they do choose to profiteer, there has been no machinery to bring to task any except the most obvious cases.

Prime contractors' purchasing agents are being notified that the same close reckoning on prices paid to subcontractors will be expected as is required on the final fabrication of materiel by the prime contractor.

Postwar Ships Planned

VANCOUVER, B. C.—Reports are still current on the Pacific Coast that Canadian National Railways and Canadian Pacific Railway authorities will build a number of luxury vessels in British Columbia shipyards as a postwar measure. It is reported that these boats will be used in British Columbia as a coastwise fleet.

It is believed that, if the Canadian National does build on this coast, it will be at the Prince Rupert drydock, which it owns. Canadian Pacific coastwise vessels would probably be built either at Vancouver or Victoria, though the engines for the boats would be brought from outside sources.

New Wildcat FM-2 Fighter Reaches Peak Output at Eastern Aircraft

NEW YORK—Navy aircraft contractors must give more attention to production of spare parts from now on, according to Admiral R. C. Ramsey. In congratulating Eastern Aircraft Division, General Motors, for delivering to date over 4400 Wildcat fighters and Avenger torpedo bombers, Navy's chief of the Bureau of Aeronautics said that contractors properly concentrated during the past two years upon the production of complete aircraft. Now, he asserts, Navy is getting a sufficient number of planes for current needs but output of spare parts must be stepped up to keep battle damaged equipment in service. On shipboard, a complete battle list of spares equals, in effect, additional fighting aircraft that could not otherwise be carried.

Manpower Use Lauded

Admiral Ramsey went on to say that Eastern's use of manpower is one of the most efficient in the Navy program, that both of the planes produced have made a great record for themselves in the Pacific.

Occasion for the Admiral's remarks was the public unveiling of a "wilder" Wildcat — the FM-2 — described by pilots as able to "climb like a homesick angel." Other improvements include a considerably shorter take-off and a lower landing speed, both of which are advantageous aboard the confined flight decks of the baby flat-tops. The FM-2, produced currently at peak requirements, has been thoroughly battle tested in recent actions in the Marshalls and in British hands attacked the *Tirpitz*. This new model Wildcat is powered by a new 9-cylinder Wright engine that enjoys a sizable increase in horsepower but is lighter in weight than the engine previously used. The 2500th Wildcat was produced April 11.

Production of the Avenger torpedo bomber, an aircraft that has successfully raked Truk and the Marianas, will be up to peak requirements in May. This plane also has a new power plant.

Both planes are exclusively produced by Eastern Aircraft, which signed the first Navy contract two years ago and produced its first plane seventeen months ago, according to L. C. Goad, general manager of the division.

Cycling Speeds Operation

In prewar, the five plants—Linden, Trenton, Bloomfield, Chevrolet Tarrytown and Chevrolet Fisher at Baltimore—hired 10,000 people. Current employment is 40,000. Supervision was expanded over ten-fold. Engineering, toolroom and purchasing functions started practically from scratch in the shift to aircraft. General Motors supplied technical and managerial skill from some 37 operating divisions in order to train and utilize local labor to the best advantage. Now one of the reasons why output is ahead of schedule is the fact that all operations are cycled, management knows what operators should produce, and supervision bears down on loafers. Supervisors hold the belief that under conditions where relatively unskilled people earn $60 per week or better, any slackness now is directly out of the taxpayer's pocket and encourages the belief that industry will pay the same wages for little effort in postwar.

High-Speed Steel, Aluminum Milling Data Sheets Offered

NEW YORK—Forty loose-leaf sheets dealing with high-speed milling of steel and aluminum have been prepared, at the request of the Office of Production Research and Development, WPB, by The Manufacturing Engineering Committee of the American Society of Mechanical Engineers. These sheets give examples of actual practice in high-speed milling, most of it in aircraft plants. Steel has been milled at cutter speeds as high as 2,600 surface ft. per min. and on aluminum at 19,000 surface ft. per min. Cutters, in general, have negative rake and negative helix angles, and feeds are high.

Sets of sheets are available without charge to production executives of plants manufacturing aircraft and their components. The sheets can be secured by addressing the Manufacturing Engineering Committee, A.S.M.E., Room 802, 40 West 40 St., New York City, on company letterhead, giving title of the one making the request and stating minimum number of sets required.

International Harvester Erects Autonomous Divisions

CHICAGO—The giant International Harvester Corporation has almost completed a corporate shift of great importance, by grouping the various activities of the company into six autonomous divisions.

The new set-up—similar in many respects to that of General Motors Corporation—marks the end of complete authority over the company's varied operations by a small group of executives.

The new divisions that have been created cover these fields: Farm implements; farm tractors; motor trucks; steel; industrial power; and fiber and twine.

Each of the new divisions has a general manager, in charge of manufacturing, as well as engineering, supply and inventory managers and a controller. Three divisions — steel, truck and industrial power—have their own sales managers. The others have sales handled through a company general line sales department.

The top executives of Harvester, mostly vice presidents, will retain authority over matters of company policy and will be available for advice.

The war has emphasized the need for the new program, since large responsibilities have been focused on a few men. Decentralization has been under discussion for some time.

In addition to General Motors, many other organizations have a divisional structure, including Chrysler and Borg-Warner, but Harvester's plan was tailored to the company's individual needs. The new system is expected to prove its worth in the postwar era, when flexibility and speed will be necessary to meet competition.

War Production Board Asks Future Auto Output Plan

WASHINGTON—Within two or three months War Production Board's automobile industry advisory committee is to report to Donald M. Nelson the capacity of the respective nine prewar producers to resume limited passenger-car production when the go-ahead signal is flashed. Mr. Nelson stressed that "not a single one of us knows when a return to the production of automobiles will be possible. It depends entirely on military events. There is no visible possibility of resumption of passenger-car production until after the victory over Germany or Japan."

Seventeen top executives were called to Washington because of WPB's desire to think through readjustment policies before the time for readjustment comes. The meeting may be the pattern for others with representatives of different industries.

Charles E. Wilson, executive vice chairman of WPB, echoed Nelson. He said, "It's obvious that for many months to come you in the auto industry will continue to have a tremendous war production job to do. But we do want to establish plans so that when the time comes we can move up quickly on this readjustment."

It is understood that WPB leans to the view that production would be limited for a time, with each manufacturer authorized to build some proportion of its prewar output. Minimum practicable number, according to industry sources, would be 2,000,000.

IT'S THE WAR!

Should AMERICAN MACHINIST be late in reaching you, please remember that wartime demands have slowed delivery services.

Inside Detroit

BY SILER FREEMAN

Straws Indicate Cars

If the trend for more and more civilian goods continues in the automotive industry, it should not be long before the passenger car field will be reached for serious consideration. The industry meeting in Washington is not the only straw in the wind.

For instance, the War Production Board's lifting the restrictions on the manufacture of spare parts for trucks, buses and farm machinery may be an inkling into the thinking down Washington way. Or the fact that civilian trucks are coming off the production lines in sizeable quantities may be another clue.

Makers Beat Goal

While each is but a drop in the bucket to the actual needs in each field, taken together they form important pieces in the puzzle of what is going on in the planning for the future of the automotive industry. The fact that civilian trucks can be produced in excess of quotas for the first three months, while meeting all military requirements for vehicles may show that the industry can do two jobs at once and creditably. The truck makers exceeded the goal by more than 1,000 vehicles, mainly in the medium class.

Permission to disregard limitations on use of materials and facilities to meet needs for replacement parts for trucks and buses is an even more encouraging sign. Up to 5 percent of materials and production time may now be devoted to civilian needs, under the amended order, and in addition, if the production of replacement parts for civilians interferes with military schedules, the WPB will step in to straighten the situation.

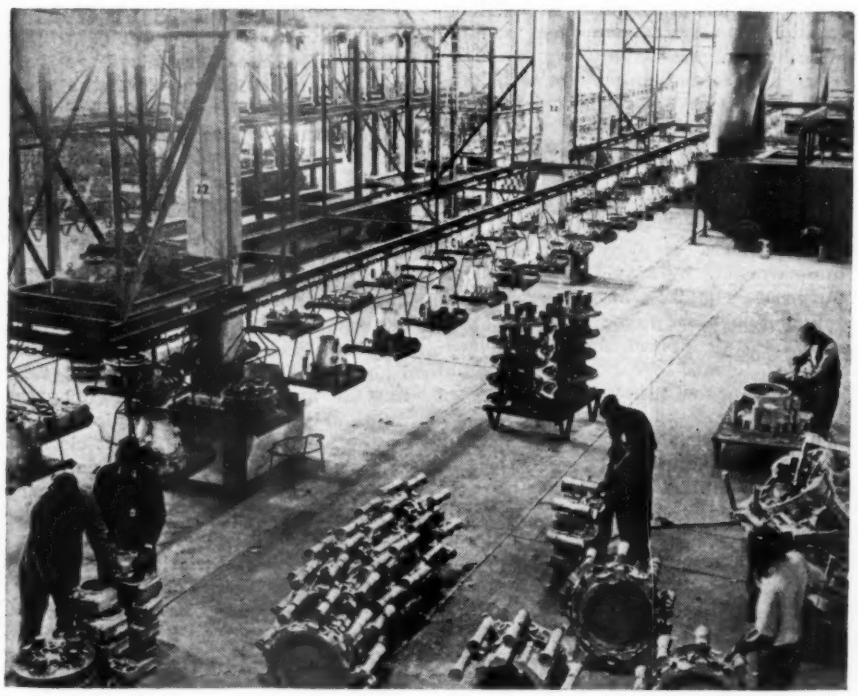
Parts Makers Study Order

The parts makers have not yet come to any definite conclusion on how this new order will affect them. They are studying the regulation and trying to fit it into the picture. Most of them are up to their ears in war work and the question in their minds is how to use this freedom to make more parts, while keeping up with the military needs.

The armed services have consistently blocked any moves to free the parts makers from war work to devote a little of their capacity to saving the nation's transportation from breaking down by supplying major parts. But through coordination of ordnance requirements and economies effected in maintenance and distribution, their problems have been simplified so that the WPB was able to get their grudging consent to letting loose of 5 percent for civilians. While small, it was still a victory for the ODT and other agencies which have been warning of impending disaster in the transportation field.

For a while there I thought sure I was going to be late.

Courtesy "Ohio Tool Topics," Ohio Tool Co.



Largest Single Unit—The magnesium foundry of Chrysler's Dodge Chicago plant, where 18 cylinder Wright 2,200 hp. engines are manufactured for heavy aircraft is one of the largest single industrial units of its kind in the world. At present, 50,000 lbs, are being melted daily and production will increase when the plant is at capacity. Above, castings are being cleaned, readied for machine operations

More Changes at Ford

While most of the automotive companies are making few changes in their top executive staffs, within the Ford Motor Car the shifts continue. Henry Ford II, grandson of the founder of the company, who only recently was announced as vice president in charge of sales, has been raised to executive vice president. This puts him right under the elder Ford and the nominal head of the Ford empire.

While young Henry II is learning the business fast and has shown ideas of his own, how far he can carry them, with his grandfather at the head of the company, is yet uncertain.

Since the resignation of Charles E. Sorensen as vice president and general manager of the company, no successor has been officially named and insiders predict that none will be, officially. Ray Rausch, who has been head of the Rouge plant, has taken over most of the duties Sorensen carried out and he will be tacitly installed as general manager without official designation.

Another resignation went into the records at Ford with the elevation of Henry II. Joseph Galemb, for the last 16 years head of the body engineering department, quit because of ill health. He has been replaced by E. T. Gregorie.

Would Stem Racket

Prosecution of so-called engineering firms, who are in reality labor brokers, is threatened by Edwin L. Cushman, War Manpower Commis-

sion director in Detroit. Evidence against one Detroit firm is already in the hands of the regional federal attorneys and a test case may be made to see how far the WMC can go in stemming the racket.

Cushman has conferred with Washington representatives on plans to eliminate the practice, which it is charged is costing the government millions on war contracts. The firms hire workers without statements of availability, as required under the WMC stabilization rules, and sends them to other areas where they are put on less important work at high wages.

Says War Program Robbed

Cushman charged that workers with skills vital to aircraft production are being sent on postwar projects, robbing the war program of needed skilled men. Where they are being used on war work, the government is paying the difference in wage rates to enrich the so-called engineering firms who hire at a flat rate and get excessive returns from war firms.

Cushman said that nearly 1,000 skilled workers have been sent out of the Detroit area in violation of WMC regulations. Contractors hiring workers through the engineering firms are paying $4.50 an hour for work which they can get done at half the price, if the men were hired through regular channels, said Cushman.

Andrew J. Higgins, New Orleans ship builder, made similar charges before the Truman committee.

Kurt J. Anderson, chairman of the tool and die committee of the regional War Labor Board, has been working with the WMC to stamp out the practices and promised that penalties for wage violations would be imposed on firms guilty of labor brokerage. While employes are also subject to penalties for violating the WMC rules on getting a certificate of availability before transferring, no decision has yet been made on whether steps will be taken against the workers as well as the engineering firms.

"Big Steel" Subsidiary Nears Tube Output Peak

CHICAGO—The newly opened plant of Tubular Alloy Steel Company, a "Big Steel" subsidiary, is near its peak output but has a tremendous manpower problem, executives of the company have declared.

Originally constructed 20 years ago and closed in 1931, the plant has been rehabilitated at a cost of $28,000,000 to meet the continually growing demand for steel tubing for planes, guns, tanks and ships.

The plant now employs 3,700 workers, almost half of whom are women. Already, during its brief period of operation, 500 workers have been lost to the armed services.

Pittsburgh Manpower Budget Plan Emphasizes Essential Industries

PITTSBURGH — As the manpower pinch grows tighter, Pittsburgh is relying on its system of rationing male workers to keep up production schedules in essential industries. The Pittsburgh manpower budget plan, supervised by the War Manpower Commission, is credited with getting more women into work and transferring some men from non-essential to essential plants.

Under the quota system, employers are placed into three categories, and some companies have been disgruntled because they were placed in group 3, whose members are restricted to employing women, part-time workers, boys under 18 and veterans of the present war. Employers in group 1, who handle direct war contracts, can hire men for replacement and expansion needs, and those in group 2, whose activities are designated as essential or locally needed, have a monthly male replacement quota of four percent of the number of men on the payroll.

Designed only as a means of doling out male workers to the best advantage and averting a mandatory 48-hour work-week for the district, the program never hoped to produce magically any large supplies of labor. WMC leaders believe, however, that it has had a psychological effect in inducing employers to use women on more jobs. Male help advertisements of some non-essential group 3 employers also indicate that the WMC has a policing job on its hands.

Steel Labor Handicap

Indicative of the critical labor situation facing the district is the fact that group 1 employers need 12,000 male workers by May 1 for expansion purposes. The lack of manpower also forced five blast furnaces out of production for a period. And the government's decision to cancel occupational deferments for those under 26 years of age is expected to drain 6,000 workers from Pittsburgh industries by June 1. This action will severely handicap steel mills in their search for much-needed common laborers, who must be recruited principally from the younger age bracket because of the heavy work involved. The nation's steel industry is working with about 42,000 fewer men than two months ago. The only hope is that most of the invasion equipment will be completed before the more stringent draft regulations act as a brake on production.

As war needs keep steel plants operating at capacity, the industry is plagued with labor inefficiency, which is rated about 20 percent above normal. The labor shortage and reduced efficiency have lengthened the time to repair equipment, resulting in loss in steel production. Labor unrest, which last year cost subsidiaries of the United States Steel Corp. 318,000 tons of steel, 2,600,000 tons of coal and 4,845,000 man-hours of work, continues to hamper steel production as the result of recent walkouts in Pittsburgh district plants of Big Steel. As the C.I.O. pushes before the National War Labor Board its demand for a 17-cent-an-hour wage boost in the steel industry, there is the possibility of additional walkouts after the second front is opened, if the union feels that steel needs for the invasion have been filled or will not be endangered by work stoppages.

In the face of these labor difficulties, the immediate Pittsburgh district has had its steel capacity expanded to 20,590,000 tons annually, twice the annual production of Japan, which is estimated to be approximately 10,500,000 tons. If the neighboring steel centers of Johnstown, Pa., Wheeling and Weirton, W. Va., and Mingo Junction, Ohio, are included, the capacity of the greater Pittsburgh district amounts to more than 26,000,000 tons a year, almost equaling Germany's 29,000,000 ton capacity, which includes Polish mills.

CIO Fails to Organize Mesta; Violence Flares at Weirton

PITTSBURGH — Recognized as bargaining agent for most of the steel industry, the C.I.O. United Steelworkers of America has had its organizational efforts defied recently at two plants in the Pittsburgh area. The C.I.O.'s seven-year campaign to obtain bargaining rights at the Mesta Machine Co.'s West Homestead, Pa., plant, one of the few steel industry units in this district to remain unorganized, was thwarted for awhile. The Mesta employees, in a National Labor Relations Board election, voted 2,428 to 1,379 against representation by the union. The C.I.O. has appealed results of the election in an effort, it claimed, to thwart a move of the company and certain employees to form a company union.

At nearby Weirton, W. Va., memories of the 1937 steel riots, induced by C.I.O. organization campaigns, were revived recently by flareups at the mill gates of the Weirton Steel Co. Followers of the Weirton Independent Union, which holds bargaining contracts for 12,000 Weirton employees, challenged C.I.O. unionists who were distributing literature at the mill gates, and fisticuffs resulted. The C.I.O. complained that its civil liberties were infringed, the governor sent state police to protect the unionists and leaflet distribution was resumed.

Wartime Washington

Hard Going for Reconversion

Reconversion to civilian production to any extent in the near future is up against one important fact: the overall war production program for 1944 is larger than it was in 1943, while the manpower supply is tighter.

Such conversion as is allowed will take the form of set-quota, sporadic production, as that of 2,000,000 electric irons announced in December, of which but ten percent is as yet authorized and of which but small production is foreseen by midsummer. Manpower is the trouble.

No Output in Areas I and II

The electric iron program is the first victim of a new policy of War Production Board to prohibit any increase in civilian production in tight labor areas. This policy has been put into effect to prevent workers from deserting war jobs for civilian activities with possible postwar prospects.

Affected by the ban on increased and new civilian production are 67 cities classified in Group I as critical labor shortage areas, and 116 in Group II as stringent labor areas. The drastic action—taken by WPB Vice Chairman L. R. Boulware in a staff memorandum to WPB bureau and division heads—in effect imposes a flat celing on civilian production in the 183 areas.

The memorandum forbids the authorization of production beyond the actual or authorized level during the first quarter of this year, whichever is lower. At the same time, a review of existing program to cut back any authorizations in excess of first-quarter levels is ordered. Exceptions may be made in Group II areas on a showing that the activity would not interfere with any military program.

Vice Chairman Boulware's order represents a body blow to plans of the Office of Civilian Requirements and the Smaller War Plants Corp. to speed programs for resumption of civilian production—particularly among little firms now idle.

A Little Knowledge . . .

Contrary to the published statement of Senator Joseph H. Ball of Minnesota—he says he gained his information from a news service reporter—the Army points out that it is not turning to the use of steel for packaging ammunition merely to utilize a surplus of this metal. The Senator had thought civilian production was being done out of an opportunity, and the Truman Committee, of which he is a member, had recommended that surplus materials be released for essential civilian production. Upon being shown AMERICAN MACHINIST'S March 30, 1944 story (page 116c), he agreed there is more justification to the change than the news service reporter had led him to believe.

Heavy Artillery Stressed

Landing craft, for many months the queen of the war production must list, will share top booking for the next ninety days with heavy artillery. In a terse message declaring that "recent developments have made imperative a sharp acceleration in the Army's heavy artillery program" during the next 90 days, the WPB advised manufacturers that artillery—cannon, ammunition and motive power units for 155 mm. guns, 8 in. howitzers, 8 in. guns and 240 mm. howitzers—now shares right of way privileges with landing craft.

Shaping Surplus Sales

Walter E. Joyce, vice president of Defense Plant Corporation, is said to be slated for the task of heading the sale of surplus machine tools for all government agencies. He has been in charge of such sales for Reconstruction Finance Corporation and will continue in that capacity under the direction of the Surplus War Property Administrator. Behind Mr. Joyce are twelve years in various administrative positions with RFC, preceded by seven years as purchasing agent and foreign representative of Ulen Engineering Corp. and four years doing administrative work with the American Technical Advisory Commission to Poland.

Conferences are being held between Surplus War Property Administration, procurement and disposal agencies, seeking to timetable physical responsibility for surpluses. Indications are that RFC will sell the durable capital goods; War Foods Administration, foodstuffs; Maritime Commission, ships; and Treasury Procurement Division, consumer goods. Drawing lines of demarcation is no small task; as, for instance, should ship's food stores be sold by Maritime Commission or War Foods Administration?

WOULD GUIDE FOREIGN SALES

WASHINGTON—Before exporting surpluses to war-devastated or industrially rising countries, some think our own markets should be allowed to attain a degree of saturation. There are others, arguing that saturation could come only with sharp price cutting and consequent economic upset, who believe exports should be made after consultation with the Foreign Economic Administration.

Those leaning to the latter belief hold that such exports should be made only to industries whose production will aid the economy of the United States through furnishing raw materials or through purchasing finished goods or components.

Emphasis on Ships and Planes

Of the record $32,647,134,336 naval appropriation bill unanimously voted by the House, better than one-third is scheduled for ships and plane construction. New ship construction will draw $8,029,000,000 for 807 combatant types and 30,151 in other categories, largely landing craft. Planes will absorb $4,600,640,000 for 24,230 new aircraft, virtually all combat types, to bring the Navy's air strength to its authorized number of 37,735 useful, up-to-date fighting craft.

Plant Visitor—Brig. General James Kirk (left), chief, small arms ammunition branch, Ordnance Department, recently visited Western Cartridge Company's brass mill with Marshall Acker (right), brass mill division sales manager and a Western director. In the background is Major R. A. Brayton, planning and scheduling unit for small arms ammunition

Double Output—Continuously moving conveyor lines at the Lockheed Aircraft Corporation more than double the daily output of the old assembly line. The P-38 Lightning fighters three times travel the length of the building

To Encourage U. S. Training of Foreign Engineers and Specialists

WASHINGTON — Foreign scientific and technical associations will be invited to select outstanding college trained industrial specialists and send them to the United States for further, intensive training, under a plan the State Department will present to the London Conference of Ministers of Education. The conference is now in session.

Foreign Economic Administration engineers who have worked for nearly three years with the wartime problems of integrating raw materials, production and shipping, found many nations in need of skilled men and industrial equipment. It was they who conceived the plan to encourage the sending of particularly well suited students to the country, to prepare them to become leaders of home-country industries. The exportation of technical knowledge and standards, they believe, will intensify mechanization of foreign countries, raise their standards of living and enable greater purchases of products of this country.

Costs would be borne by the sponsoring scientific or technical association of the foreign country.

Some industrialists have shown reluctance to take in outsiders because they have a technique or a patent that could be stolen. Others, like ball-bearing makers, say that the technique is so difficult to master that they have practically no fear of out-and-out competition and can, instead, benefit by teaching foreigners how to make equipment that will use U. S. bearings.

Train U. S. Students, Too

Under the proposed plan, between five and ten thousand U. S. college graduates also would be enrolled in courses designed to prepare them for service with foreign companies and branches of domestic firms on whom the work of rebuilding devastated industries will fall.

General Campbell to Speak At AMTDA War Conference

PHILADELPHIA — Major General Levin H. Campbell, Jr., chief, Ordnance Department, will speak at the War Conference of the American Machine Tool Distributors' Association, which will be held at French Lick Springs Hotel, French Lick, Indiana, May 25 and 26.

John S. Chafee, director, Tools Division, WPB, will talk at the morning session, May 26.

Albert M. Stedfast of Stedfast & Roulston, Inc., association president, will open the War Conference, following which Mr. Tell Berna, general manager, National Machine Tool Distributors' Association, will speak. Mr. W. R. King, Apparatus Department, Industrial Resale Division, General Electric Co., will talk on "The Advance of Electronics in the Machine Tool Field." Mr. S. D. Fendley of General Electric Company, will discuss "Electronic Adjustable Speed Drives."

Mr. A. G. Bryant, chairman of the association's committee on government relations, will speak on Washington developments, while Mr. J. Roy Porter, chairman of the planning committee, will discuss postwar disposal of surplus machine tools. Other committee chairman will review the work of their groups.

Armco Marks Founder's Day

MIDDLETOWN, OHIO—The birthdate of the late George M. Verity, April 22, was observed as Founder's Day by The American Rolling Mill Company organization throughout the world.

Inspired by a quotation of which the late founder was fond—"He lives most who serves best"—observance was designed to inspire Armco men and women to do something which will in some way contribute to human happiness.

Observance of the day will be a fixed date on the Armco calendar from now on.

NMTA Defers Convention

CHICAGO — The National Metal Trades Association has postponed its annual convention, scheduled for May 16-19 in New York City, as its "further contribution to the war effort and all-out production for victory," according to Association President Roe S. Clark's announcement of the decision of the administrative council. The holding of the convention is tentatively proposed for Fall, if "the demands of railroad transportation lessen and the war situation permits."

Makes Mobile Bofors

OTTAWA—Mass production, by a Canadian automotive plant at Windsor, of a self-propelled Bofors 40 mm. anti-aircraft, anti-tank gun has been announced by Munitions Minister Howe. The gun itself is the standard Canadian Bofors, manufactured in a Hamilton ordnance factory.

A model being produced for Great Britain is installed on a Morris chassis; that for the Canadian army is mounted on a Ford chassis, propelled by a Ford engine more powerful than the British one. The chassis is actually a modified version of a well-known artillery tractor. It has a road speed up to 40 m.p.h.

The Bofors is automatic and throws 2 lb. shells to a height of 19,000 ft. at 120 rounds per min.

Spotting the Air News

More in March

A new production record was set in March when the aircraft industry delivered 9118 units. But Charles Wilson, chairman of the Aircraft Production Board, was careful to say that it might be difficult in coming months to keep the production curve on the upgrade or even to prevent it from dropping down. Manufacturers are still troubled by engineering changes, and are threatened, in addition, with loss of many important men to the under-26-age draft. The continued shift to heavier planes tends to retard their unit output, at the same time tending to increase their airframe poundage. The March weight output was 103.4 million pounds as compared with 93.5 in February, a substantial increase.

Will Increase Range

The B-29 program is greater than most people have imagined. Even experienced aircraftmen express astonishment. Air Force is intent upon carrying heavier precision bombing over longer distances. The B-29 will be much more effective on targets in Germany already reached by the B-17 Fortress, and it will be indispensable in the long-range job to be done on Japan out of Chinese bases (550 to 1,200 miles) and from any other bases that may be obtained. The main Boeing plant at Seattle, which has been producing B-17s in thousands, will be converted progressively to B-29s, with minimum interruption of production. Boeing's Renton and Wichita plants were already on B-29s. Douglas and Lockheed will continue production of the B-17s, as will other plants just getting under way.

Production Is Indicated

You get some idea of B-17 production from reports of United Air Lines, which has processed 3,500 of them in its Cheyenne modification plant, and from Continental Air Lines, which put through 1,800 at Denver modification center. Boeing recently announced a world's record for a single month's delivery of completed four-engined bombers, exceeding the output of any other plant, "American or foreign." Boeing is considering various lines of durable goods for postwar production, from household machines to automobiles, any of which would have "big name" appeal, and plenty of engineering experience behind it.

Electronic Quickie—The use of electronic-controlled torque tension deep-hole drilling machines in Ford's Rouge plant has cut from 15 to three minutes the time needed to drill 18 holes in front and rear crankcase sections of 2,000 hp. Pratt & Whitney airplane engines. Each of the machine's six heads is so controlled

Anniversary Celebrants—Children of Buick war plant workers born at time of ground breaking for the engine plant, 1941, helped celebrate the mutual anniversary at a company party. Three year old Marguerite Lazeau watches father, Vernon, work on an engine power section of a Liberator bomber

Statistics

Our Big Figures Editor says: Republic Aviation has delivered more than 6,500 P-47 Thunderbolt fighters in the 48 months since the first one was test-flown. Production of Allison liquid-cooled engines, which power about half of all Army fighters, has just passed the 50,000 mark; No. 1 had 1,000 horsepower and No. 50,000 has 1,800. Biggest increase granted by Defense Plant Corporation to the aviation industry recently goes to General Motors, Detroit, for facilities at Buffalo and at Tonawanda, New York, where Chevrolet will be tooled up to build Pratt & Whitney R-1830 engines. Wright Aeronautical produced Cyclone and Whirlwind engines aggregating 284,200,000 horsepower from Pearl Harbor to Jan. 1, 1944, the company reports. Dodge Chicago plant of Chrysler Corporation has opened its 500-acre aircraft engine plant, described as the world's biggest, and is in production of 2200-h.p. Wright aircraft engines.

For Postwar Passengers

Two big airplanes are showing on the postwar horizon. One is Consolidated Vultee's Model 39 to be test-flown this spring, to have a range of 4,000 miles, to seat 48 passengers or sleep 24, with baggage and 1,200 pounds of mail. This is a new fuselage with Liberator (B-24) wings, engines,

tail assembly and landing gear. The other one is the Douglas DC-7, to seat 86 passengers or sleep 76. It will have a wing span of 173 feet, a height of 43 feet, cruising range of 4,000 miles, gross weight of 85,890 pounds, useful load 59,100, speed up to 400 m.p.h., and ceiling about 40,000 feet with supercharged passenger cabin for sea-level breathing. It will cost about $1,250,000, carry four 3,000 hp. engines, have tricycle landing gear with two wheels on each leg. This plane will be an expanded version of the highly successful DC-4, on which airlines were about to take delivery when the war started. The DC-4 was a direct descendant of the two-engined DC-3, most numerously produced commercial plane in the world.

Plane Predictions

An authoritative book, "Wings After War," was released last fortnight by S. Paul Johnston, former editor of *Aviation Magazine*, now an executive with Curtiss-Wright. Mr. Johnston says: Conventional airplane models will persist for several years after the war; perfection of the helicopter will take years of engineering effort; present light planes for personal use are so limited in utility that the annual rate of sale will not approach 20,000 for five years or so; "roadable" designs, to improve utility, will present difficult weight and cost problems; the all-wing (flying wing) design will not be practical in small sizes—in fact, its practical weight begins at 350,000 pounds; the future of cargo glider trains is not promising; a fleet of less than 1,000 pre-war transport planes can handle domestic traffic for five years; the Atlantic fleet will require about fifty 50-passenger planes at the end of five, and forty 100-passenger planes at ten years. The author believes that all the air miracles promised by the popular press, including jet propulsion, will be realized, but not so soon as most people think.

Plan Training Program

IOWA CITY—The University of Iowa will again present a three-week management course, June 12 to 30, covering production planning, plant layout, motion and time study, wage incentives and training programs. Fundamental training will be combined with practical applications. The course is designed to benefit those responsible for reducing manufacturing costs and increasing production.

Report Truck Bookings

CHICAGO — Domestic bookings of electric industrial trucks and tractors during December totalled 244 units, according to the Industrial Truck Statistical Association. The net value of chassis only booked during December totalled $986,682.43, compared with $1,141,589.84 in November.

Material Shortages Block Output Of Consumer Goods by Canadians

OTTAWA—Canada's 1944 output of consumer goods will be only a fraction of modest quantities anticipated by control officials and manufacturers at the turn of the year when a two-year-old ban on some five hundred items was lifted. One plant is turning out a few washing machines but there has been practically no resumption of production of refrigerators, electric stoves and other household appliances.

Idle Capacity

Basic reason is continued shortage of steel sheets. Odd lots are available in sizes not in urgent demand for war and essential civilian uses. Manufacturers who can pick up these or who have small surpluses on hand are free to make almost anything they please if there is no early prospect of their idle capacity being required for war work. But control chiefs of Munitions and Supply Department are discouraging even partial reconversion in big plants which have been almost entirely engaged in munitions production even when current contracts are running out. They want idle capacity in these plants reserved against possible necessity of new expansions in war output after the invasion drive starts in Europe.

A third reason for the hold-back in civilian goods production is outside Canadian control. Almost all major consumer products require components from the United States—motors and other parts for refrigerators and washing machines, special wire for electric stoves, other components not made in Canada. There is no assurance that these will be obtainable even in small quantities and some are not available at all.

Token Shipments

Manufacturers attribute this situation to intervention from Washington aimed at guarding against the use of American parts in Canadian production of token exports. Canadian Manufacturers' Association and industry generally has been urging Ottawa to clear the way for small token exports to empire and South American countries of goods which Canada sold them in substantial quantities before the war, in order to remind old customers of Canadian brands and trade names. Lately Trade and Commerce Department has shown a disposition to fall in with this plan and has been helping to secure release by Munitions and Supply controllers of raw materials for the purpose. Washington's attitude, it is now claimed, has virtually ditched the proposal, at least temporarily.

Disappointment among manufacturers is not allayed by rumors—so far unconfirmed—that more than token shipments of products of which they would like to send samples abroad are reaching export markets from the United States.

Farm Machinery Program Adheres to 1944 Schedule

OTTAWA—Canadian farm machinery production is being maintained at close to the 1944 schedule, in comparison with the lag in the United States. Control authorities are satisfied with the situation. Munitions and Supply Department released 81,750 tons of steel for farm machinery manufacture in the fiscal year commencing April 1, representing an increase of 271.1 percent over the quantity used in 1939.

Rehabilitation Earmark

A good part of output will be earmarked for the United Nations rehabilitation program for liberated countries. A recent Washington statement said that more than half of the machinery called for in the program as revised downward would be made in Canada or Britain.

It was close to mid-April before Canada's Wartime Prices and Trade Board got around to following the United States into permitting resumption of manufacture of straight and safety razors for civilian use.

Metal Restriction Eased

Simplification restrictions on a number of metal products are being dropped as supply of raw materials improve. Latest item to be released is galvanized steel wire strand.

Largely to offset increasing shortage of paperboard and glass for packing, Ottawa has authorized a substantial increase in use of metal plate for packing containers. Many fruits and vegetables and other food items which have been under quotas of metal containers based on percentages of quantities used in previous years are freed from restrictions on specified can sizes. In other cases 100 percent of quantities used in the 1941 pack is now allowed.

The easing also extends to containers for paints and oils and other commercial products such as insecticides and anti-freeze.

Although Canada has a surplus of copper civilian uses are still closely restricted to permit its being turned over to the United States.

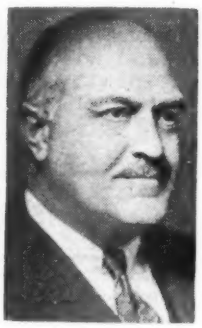
Substitutes for metal fittings for Canadian-built naval vessels are being discarded and manufacturers of metal equipment have sizeable orders.

Canadian production of war supplies will be at the rate of about $40,000,000 a week over the next year, total war outlay being placed at $100,000,000 a week.

Names in the News

Frederick W. McIntyre, Sr., formerly vice president and general manager of Reed-Prentice Corp., Worcester, Mass., has been named president to succeed **Ralph E. Thompson.** Mr. Thompson has been elected chairman of the board of the corporation. **Fredrick W. McIntyre, Jr.** is assistant to the president.

Reed-Prentice Head and Chairman



Bachrach

F. W. McIntyre, Sr. R. E. Thompson

D. J. Stewart, previously assistant general manager of Barber-Colman Co., Rockford, Ill., has been named vice president and general manager succeeding Earle D. Parker. At the same time announcement has been made that **H. F. Collins,** formerly assistant general superintendent, has been appointed works manager.

Robert S. Archer has joined Climax Molybdenum Co., New York, N. Y., as metallurgical assistant to the vice president. Since 1934 Mr. Archer has been chief metallurgist of the Chicago district of Republic Steel Corp.

J. J. Pugh has joined Walter Maguire Co., New York, N. Y., as vice president in charge of sales activities. He was formerly sales manager of Lathrop-Paulson Co., Chicago, and the Rice & Adams Corp., Buffalo.

William S. Saylor has been appointed assistant manager of sales of the New York district of Carnegie-Illinois Steel Corp. His former position of manager of sales of the Boston district will be filled by **William G. Crook.** In turn, **James J. Henderson** succeeds Mr. Crook as manager of sales of the Buffalo district.

C. G. Gress, manager of the Detroit branch office of the plastics division of Monsanto Chemical Co. since 1940, has been named sales manager of the division's resinox department at Springfield, Mass. **Carl Whitlock,** of the technical service department of the plastics division, has become Detroit branch manager in charge of plastics materials sales in that area.

Al J. McCullough and **Jack E. MacConville** have been placed in joint charge of industrial instrument sales for Brown Instrument Div. of Minneapolis-Honeywell Regulator Co. at the Cleveland office. Mr. McCullough has been with the Cleveland branch for the past eight years, while Mr. MacConville has been connected with the Brown division for the past 15 years, having spent most of that time in the Philadelphia plant.

Ernest Kuehn, who has been associated with Electro-Motive Div. of General Motors Corp., La Grange, Ill., as special representative of H. L. Hamilton, vice president, has become manager of the Pacific Coast region for Electro-Motive Div. Offices have been opened at 2913 Russ Bldg., San Francisco.

Kentner L. Wilson has been named branch manager of Minneapolis-Honeywell Regulator Co. Detroit office. For the past three years Mr. Wilson has been industrial manager of the Brown division at Cleveland.

William C. Johnson, James M. White and **William A. Roberts** have been appointed vice presidents of Allis-Chalmers Mfg. Co., Milwaukee, Wis. Mr. Johnson, who has been general sales manager, joined the company in 1924 and has served in various district offices. Mr. White has been associated with Allis-Chalmers since 1929, becoming works manager in 1942. For the past four years Mr. Roberts has been manager of the company's tractor division.

W. C. Johnson

Jas. M. White W. A. Roberts

Westinghouse International Chiefs

Blank & Stoller

John W. White

Pach Bros.

Wm. E. Knox

John W. White has been elected president and general manager of Westinghouse Electric International Co., a subsidiary of Westinghouse Electric & Mfg. Co., E. Pittsburgh; and **William E. Knox,** formerly assistant general manager, has been advanced to vice president. Mr. White was previously vice president and general manager of the company.

Heywood Fox

Heywood Fox, assistant to the president of American Optical Co., Southbridge, Mass., has been appointed president of Spencer Lens Co., Buffalo, N. Y., scientific instrument division of American Optical. Mr. Fox joined the organization in 1941, and was assistant to the president of American Optical from 1936 to 1940. Previous to that he had been connected with Chase National Bank for three years.

K. T. Vangsnes, for the past five years vice president of Magnesium Products, Inc., Los Angeles, has become head of the magnesium division of Dow Chemical Co.'s office in that city.

W. G. Jerrems, assistant manager of the Douglas Aircraft Co. plant at Long Beach, Calif., has been named manager of the Tulsa, Okla., plant of the company.

Carroll M. Snyder, formerly vice president at Herring, Hall, Marvin Safe Co., Hamilton, Ohio, has joined C-O-Two Fire Equipment Co., Newark, N. J., as assistant to the president.

H. R. Metz has been appointed works manager in charge of all divisions of Eisemann Corp., Brooklyn, N. Y. Recently Mr. Metz has been works manager of the diesel fuel injector plant of American Bosch Corp. at Providence, R. I.

New President and a.c.f. Chairman

F. A. Stevenson

Chas. J. Hardy

Frederick A. Stevenson, senior vice president and in charge of operations of American Car & Foundry Co., New York, N. Y., has been chosen to succeed **Charles J. Hardy** as president of the company. Mr. Hardy has been named chairman of the board. Both men have been connected with a.c.f. for many years.

I. G. Bohrman, who has directed radiator sales for Perfex Corp., Milwaukee, has been appointed manager of the radiator division. The firm will shortly occupy additional plant space.

BUSINESS ITEMS

Cutler-Hammer Inc., Milwaukee, maker of controls, switches and of other electrical products, has established an office at 30 E. Broad St., Columbus, Ohio, with Russell D. Yoder sales engineer in charge.

A. O. Smith Corp., Milwaukee, has appointed Pacific Metals Co., Ltd., as distributor in California, Nevada and Arizona for Smithway certified electrodes, a.c. welders and other welding equipment. Stocks of these products will be carried at the company's warehouses in San Francisco and Los Angeles.

Rogers Machine Wks., manufacturer of the Perfect 36 vertical turret mills, has moved to larger general and sales offices at 1807 Elmwood Ave., Buffalo.

Lovejoy Tool Co., Springfield, Vt., has named **Walter F. Greene,** 658 Fairfield Ave., Indianapolis, Ind., and **Don Hall Tool Co.,** 20 N. Wacker Drive, Chicago, as sales representatives in those districts.

Dow Chemical Co. has opened an office in Detroit with Walter J. Truettner as head. He has been associated with the Dow Magnesium Corp. since 1942 and has resigned his position as secretary of the Marysville plant to take over his new duties in Detroit.

OBITUARIES

Frank B. Wilkinson, 87, retired industrialist and founder of Logansport Machine Co., Logansport, Ind., died in that city following a lingering illness. He was instrumental in the founding of several other manufacturing companies. In 1916 he formed the Logansport Machine Co. to produce air and hydraulic operated equipment, and the company expanded in 1929, acquiring its present plant location. Mr. Wilkinson had not been active in the business for the past several years.

Chas. L. Taylor

Charles L. Taylor, 68, president of Taylor & Fenn Co., Hartford, Conn., and Collins Co., Collinsville, Conn., passed away at his home after a brief illness. Mr. Taylor became a foreman of Lincoln & Co. early in his career, and later purchased the Lincoln plant, conducting it under the name of Phoenix Iron Wks. Co. Later the name was changed to Taylor & Fenn Co. He became treasurer of the company in 1901, and president in 1924. Mr. Taylor had been president of the Collins Co. since 1921.

F. F. McIntosh

Frederick F. McIntosh, 65, director of metallurgy of Crucible Steel Co. of America, New York, N. Y., died in Sewickley, Pa., after a short illness. He began his career with Crucible at the La Belle Wks. where he remained for two years. Later he joined Bethlehem Steel Co., Bethlehem, Pa. After two years at Bethlehem he became assistant professor of metallurgy at Carnegie Institute of Technology. After serving in World War I Mr. McIntosh returned to Carnegie Institute until 1926, when he rejoined Crucible Steel, becoming director of metallurgy in 1939.

James Stewart Nicoll, 53, vice president of Kelly O'Leary Steel Works, Chicago, passed away following an illness of several months. He became associated with Kelly at the age of 17, moving with the company in 1911 to the Clearing Industrial District where he was prominent in its early development. He continued active association in the steel forging and fabricating business until his death.

Bion B. Farnham, 77, one of the founders of the Farnham Mfg. Co., Buffalo, N. Y., died in Johnsonburg, N. Y. He helped organize the company in 1909 and was general manager for many years.

Humphrey J. Kiely, 78, retired executive vice president of Link-Belt Co., with headquarters in Chicago, died in New York recently. He had been connected with Link-Belt for 50 years, starting as an office boy. For 20 years before his retirement, Mr. Kiely was in charge of the company's foreign trade, traveling extensively in Latin America and the Far East.

Kenneth W. Howard, for seven years sales engineer of Giebel Machine Tool Co., New York, N. Y., passed away suddenly.

MEETINGS

American Electroplaters Society. Annual meeting. Hotel Cleveland, Cleveland, Ohio. June 12-14.

American Gear Manufacturers Assn. Annual meeting. Westchester Country Club, Rye, N. Y. May 22-24.

American Machine Tool Distributors' Assn. War conference. French Lick Springs Hotel, French Lick, Ind. May 25-26.

American Management Assn. Annual meeting. Hotel Pennsylvania, New York, N. Y. June 8.

American Iron & Steel Institute. Waldorf-Astoria Hotel, New York, N. Y. May 25.

American Society for Testing Materials. Annual meeting. Waldorf-Astoria Hotel, New York, N. Y. June 26-30.

American Society of Mechanical Engineers. Semi-annual meeting. William Penn Hotel, Pittsburgh. June 19-22.

Chamber of Commerce of the U. S. Annual meeting. Waldorf-Astoria Hotel, New York, N. Y. May 3-5.

National Metal Trades Assn. Annual meeting. Biltmore Hotel, New York, N. Y. May 17-18.

Society of the Plastic Industry. Annual meeting. Edgewater Beach Hotel, Chicago, Ill. May 11-12.

Westinghouse Machine Tool Forum. Wm. Penn Hotel, Pittsburgh. May 1-2.

Shop Equipment News

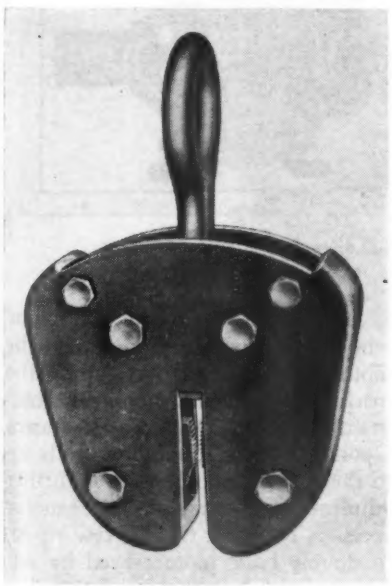
Atlantic Grinding Wheel For Molded Rubber Products

A grinding wheel for finishing molded synthetic rubber products has been developed by Atlantic Abrasive Corp., 516 Pearl St., South Braintree, Mass. The B-C grinding wheel is made in a variety of shapes and sizes. This grinder is said to remain cool on all types of rubber and to remove the fire hazard in grinding or finishing operations.

Mine Safety Steel Grab Handles Various Shapes

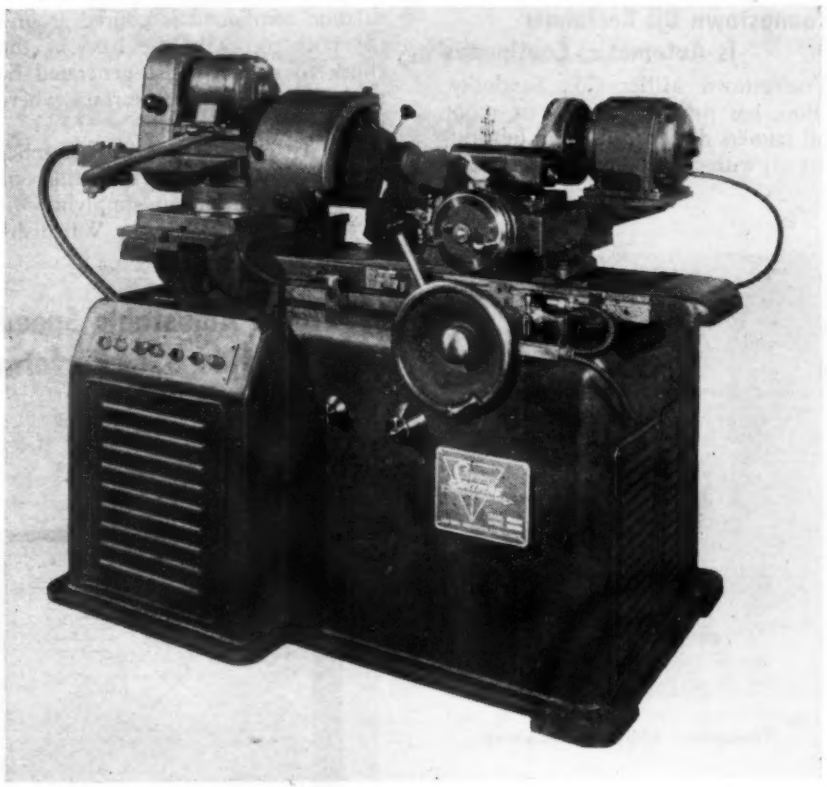
A steel grab has been produced by Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa. The grab handles steel plate or structural forms in various shapes and sizes with edge thicknesses up to 5/8 in. It has a rated capacity of 3 tons.

Its simple principle of operation



M.S.A. steel grab

and method of attachment permits use for lifting vertically or pulling horizontally. When the grab is hooked and pressure applied, two multi-toothed jaws close on the form and hold it tightly until the lift or pull is completed.



Sav-Way Spitfire internal grinder

Sav-Way Internal Grinder With High Table Speed and Short Table Stroke, Has Electro-Hydraulic Control

The MH-1 internal grinder has been christened the Spitfire by Sav-Way Industries, 8493 East Eight Mile Road, Detroit 13, Mich., because of its high speed. Outstanding features are the 5/32 in. minimum table stroke and the rapid table feed and reverse which combine to give exceptional speed on short work.

Flexibility of the Spitfire is achieved through a combination of hydraulic operation and electric control. Solenoid operated valves and aircraft type limit-switches provide constant control and reduce time lag materially. In addition, the machine also is equipped with hand table feed which may be engaged or disengaged with a simple movement of a control lever.

Manual or electrically controlled power cross-feed is available. The latter gives a cross-slide ratchet feed of 0.0001 in. per tooth, resulting in 0.0002 in. increase in diameter of the hole. The cross-slide handwheel is graduated in increments of 0.000125 in.

Standard machines have manually operated wheel trueing mechanisms, with cam return, but a semi-automatic diamond wheel dresser is available. The latter is electrically operated with automatic, adjustable slow down of table traverse while dressing the wheel.

The new grinder is equipped with the Sav-Way Gold Seal spindle which provides for a constant flow of oil-mist through the working parts of the spindle and keeps the spindle free from dirt and coolant. The spindle is driven by a 3-hp., 36,000 r.p.m. dynamically balanced motor and the workhead spindle is driven by a 1/2-hp., 1,140 r.p.m. dynamically bal-

anced motor. Workhead spindle speeds of 90, 145, 235 and 365 r.p.m. are provided through an adjustable V-belt drive. Neoprene pads inserted between the bed and the base reduce vibration and prevent distortion of the base from being transmitted to the work.

Youngstown Oil Reclaimer Is Automatic, Continuous

Youngstown Miller Co., Sandusky, Ohio, has produced a line of robot oil refiners designed to clean lubricating oil with continuous and automatic

Youngstown Miller oil reclaimer

operation. Ability to restore transformer oils to 30,000 volt dielectric strength is claimed for this machine. A single machine is equipped to serve a small or large power plant.

This oil refiner is capable of removing fuel dilution, acids, solid and colloidal carbon, dirt and similar matter. Also, it can restore oil emulsified by water. The process involved utilizes common refinery earths that are readily available.

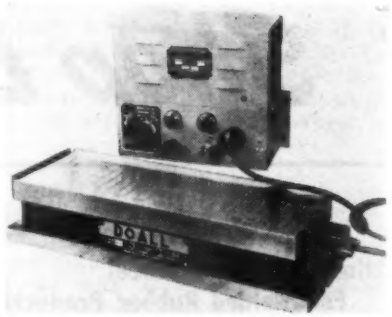
DoAll Chuck and Selectron Provide Magnetic Pull Control

Continental Machines, Inc., 1301 Washington Ave. South, Minneapolis 4, Minn., has manufactured a combination electro-magnetic chuck and selectron. The amount of magnetic pull of the chuck holding the work to be ground is under control of the operator. The DoAll selectron uses electronic power to control flow of magnetic pull in the chuck and to demagnetize the chuck when the work is to be removed.

DoAll chucks are available in a 6×18 in. size at 125 watts and an 8×24 in. size at 175 watts. Both sizes can be operated with either 110 volt d.c. or 220 volt d.c. input. The selectron is supplied in 120 or 220 volt a.c. input and 220 d.c. output of 175 watts.

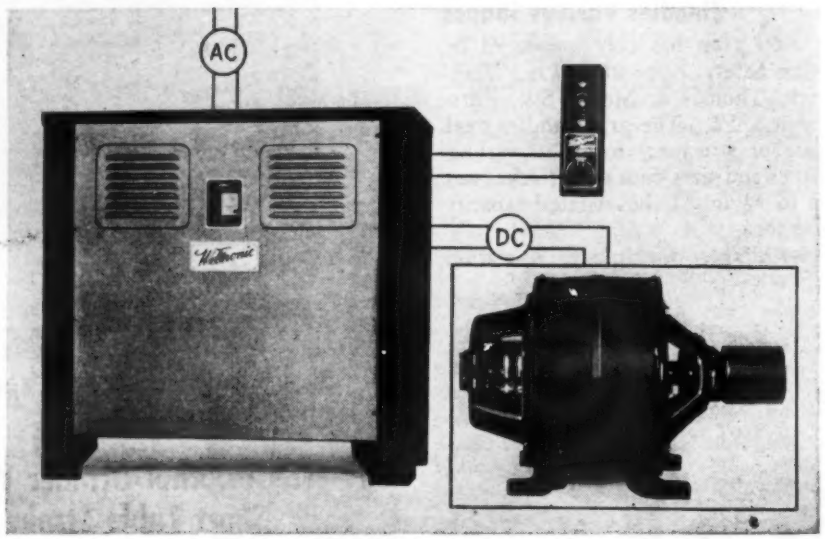
The chuck unit is made of cast steel, and pole pieces are wound with plastic insulated wire. A special insulation compound is poured around the pole pieces in the base of the chuck to conduct heat generated by the coils to the outer surface where it is rapidly dissipated.

The DoAll selectron utilizes tubes for the full wave rectification of alternating current in supplying direct current to the chuck. When demagnetizing, the current is alternately reversed and reduced by the selectron to withdraw all residual magnetism from the chuck.



DoAll chuck and selectron

Weltronic Adjustable Speed Electronic Drives Provide D.C. Performance From A.C. Power Source



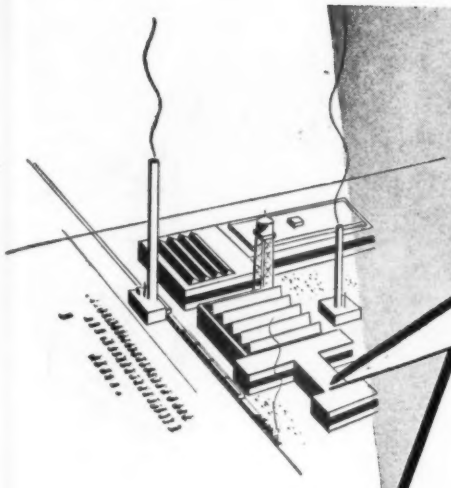
Weltronic electronic drive

A line of adjustable speed electronic motor drives providing direct current motor performance from alternating current power without requiring special motors has been announced by Weltronic Co., 20735 Grand River, Detroit 19, Mich.

This self-contained unit is applicable to any machine driven by a direct current shunt motor. Electronic rectifier tubes are employed to convert alternating to direct current, supplying separate power to the direct current motor armature and field circuits. Each circuit is individually controlled through other electronic tubes to provide speed adjustment and current regulation.

Full torque can be provided even at the lowest speeds, making it possible to vary the speed of a machine without sacrificing torque. If the motor stalls due to overloading the machine, the electronic controls automatically limit the current drawn. Upon restarting, the motor pulls up to the selected speed without further adjustment. Stepless control of motor speed is obtained from a few r.p.m. to double basic motor speed by setting a dial. Adjustment of this dial may be made while the motor is operating, or it may be preset.

In addition to the start, stop and speed selection controls of standard units, reverse, with or without an independent reverse speed selection control, can be supplied. Dynamic braking, dual control stations, limit switches or sequence and time con-



"The lathe had to be good enough for today and for years to come. —Checking them all, our choice was an L & S"

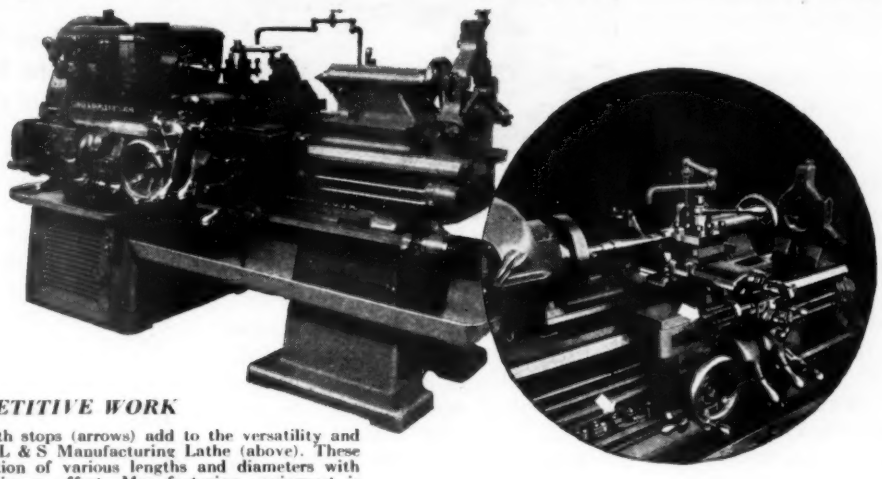
A GOOD lathe, properly handled, can last a long time . . . even several decades. Over many years, however, important changes occur. Cutting tools are improved. Newer metals and alloys are developed. Higher speeds are required. Automatic features are introduced transferring skill from worker to machine. All of which brings up the question: how versatile, how well adapted will your lathe be to meet such changing factors in years to come?

When considering lathe values and likely future requirements, you'll find it pays to look into an L & S. Fifty-two years of *continuous manufacture of lathes only* has resulted in what we call "engineering foresight" . . . a specialized ability to make lathes unsurpassed in profitable performance year after year under changing conditions, with maximum efficiency and accuracy.

For a practical demonstration as to how "engineering foresight" can help your production—today and in years to come—call on Lodge & Shipley Engineers.

Prepare for the Coming Battle of Markets!

Someday—perhaps sooner than expected—you'll resume production of pre-war goods. When that day arrives, you'll want no delay or top-heavy costs. Plan now with L & S Engineers for profitable lathe performance. Be ready for "Re-Conversion" Day!



CUT TIME ON REPETITIVE WORK

Multiple diameter and length stops (arrows) add to the versatility and productive capacity of the L & S Manufacturing Lathe (above). These stops permit rapid duplication of various lengths and diameters with extreme accuracy and minimum effort. Manufacturing equipment is available for all sizes of lathes. Write for literature.

ENGINE
AUTOMATIC
TOOL ROOM
OIL COUNTRY
LATHES

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, 25, OHIO, U. S. A.

L & S LATHES

trols may be used with the units for complete machine or cycle control.

Capacities are available from ½ to 3 hp. single phase and 5 to 10 hp. 3-phase, and other sizes or designs for specific applications can be supplied. Standard voltages are 220 or 440 at 60 cycles, 550 volt and 25 or 50 cycle machines can be furnished.

New England carbide tipped tools

New England Cutting Tools Made in Two Carbide Grades

A line of standard carbide tipped cutting tools in six shank and tip styles has been produced by New England Carbide Tool Co., 60 Brookline St., Cambridge 39, Mass. Tips are finish ground so that all exposed surfaces have a mirror finish. These tools have a black, rustproof finish, and the name and tool style appear in white on the side.

The cutting tools are supplied with either of two grades of carbide. The U grade, identified by a red tip on the tool shank, will cut all materials except steel. S grade is identified by a blue tip and is supplied for cutting steel.

Turco Re-Lite Paint Stripper Formulated for Blackout Paint

A blackout paint stripper for both asphaltic and non-asphaltic types has been produced by Turco Products, Inc., 6135 South Central Ave., Los Angeles, Calif. Re-Lite is a ready-to-use stripper which clings on the surface. It is said to be non-corrosive to any metal, and will not attack concrete, brick, stone, tile or marble. This material becomes inactive when it comes in contact with water.

De-Sta-Co T-shaped toggle clamp

De-Sta-Co Light-Duty Clamp Made With T-Shaped Handle

A small, light-duty toggle clamp with a T-shaped handle has been added to the De-Sta-Co line by Detroit Stamping Co., 343 Midland Ave., Detroit 3, Mich. This clamp is available with either the straight solid work bar, No. 207-TS or No. 207-TU. In this latter model the retaining bolt can be set at any desired distance from the handle, thereby making the clamp adaptable to varied needs.

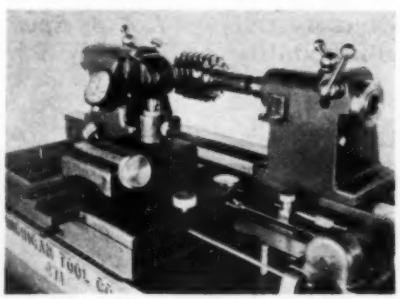
Dimensions are 3⅞ in. from end of the work bar to end of the base, and 4 in. high when in locked position.

Michigan Checking Machine for Hobs and Milling Cutters Checks Spacing, Rake Angle, Taper and O.D. of Flutes

A machine for checking the correct resharpening of hobs or milling cutters has been produced by Michigan Tool Co., 7171 East McNichols Road, Detroit 12, Mich. Hobs or milling cutters with a maximum outside diameter of 10 in., maximum length of 8 in. and arbor or shaft length of 16 in. maximum may be checked on this Model 471 machine for spacing of flutes (either parallel or spiral gash), rake angle of flutes, parallelism of straight flutes, taper on the outside diameter, and concentricity of proof diameters by means of two standard interchangeable indicator assemblies.

Two additional interchangeable indicator assemblies are available for checking lead of hob or spacing of threads in multiple thread jobs, measured in a plane parallel to the axis of the hob; and for checking depth of tooth of topping hob.

A ground surface angle block is mounted on the tailstock to simplify initial setting of indicators for such checking as rake angle and parallelism. The projecting ledge is used with Jo blocks to set the indicator for checking hooked or raked hobs. The indicator base is ball bearing mounted, and in a plane parallel to the horizontal plane of the centers. Initial settings are accomplished by rolling the indicator opposite the ground surface block and adjusting the vertical setting of the indicator.



Michigan hob and cutter checker

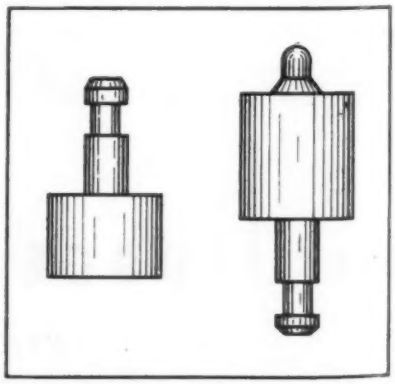
After this indicator setting, the base of the indicator is returned opposite the tool for checking sharpening inaccuracies. A small weight suspended over a pulley propels the sliding indicator base when checking parallelism or lead in the axial plane.

Movement of the indicator base is provided by a hand operated gearing. Indicator assemblies are spring actuated for checking both in planes parallel or at 90 deg. to the horizontal plane of the centers. The tailstock center is also spring actuated.

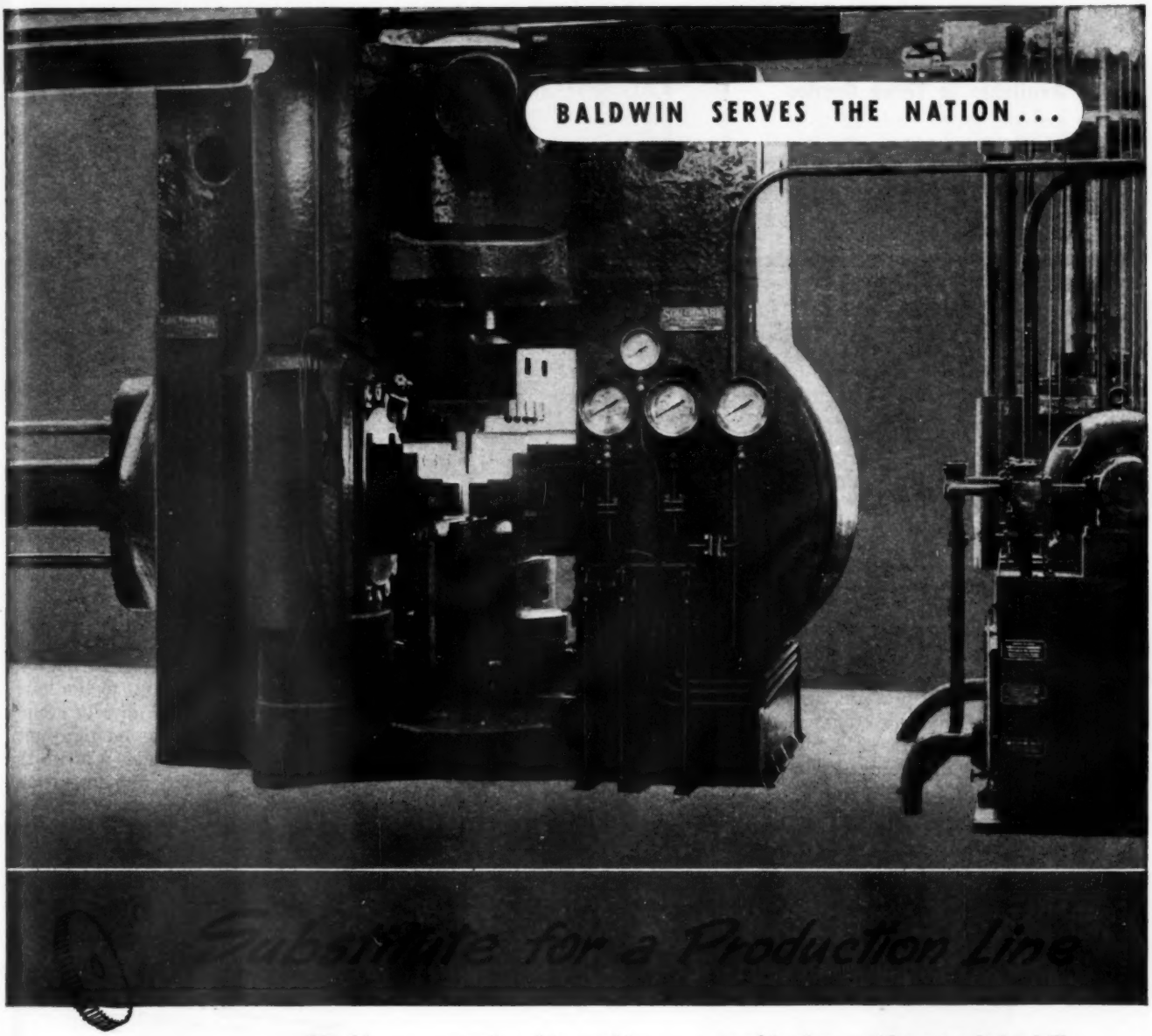
Topflight Two-Piece Dimpler Coins Metal Into Dimples

Topflight Tool Co., Towson 4, Md., has designed a two-piece dimpler to coin metal into dimples that nest above or below other sheets of any thickness.

The male punch, which is made in one piece, requires no adjusting. The curved mating surfaces overcome spring-back tendencies, giving a flat support for skins.



Topflight two-piece dimpler



Would you recognize this machine as a combination molder-caster-lathe-drill press and milling or hobbing machine? It is literally handling all of the jobs that all those pieces of equipment do in the ordinary production line . . . and doing it in *one operation*. The material goes in, a handful of powdered metal. It comes out a gear, cam, or other part, ready to install!

Building such a press to mold metal posed a lot of new problems, for instance, uniform density of the molded material was imperative. But Baldwin experience was ready and waiting, and the job was done *right* without time wasting experiment or guesswork.

If your production planning . . . current or post-war . . . contemplates the use of presses, Baldwin experience can help *you*, too. Let us know your problem. Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia, Pa., U. S. A. Pacific Coast Representative: The Pelton Water Wheel Co., San Francisco, California. In Canada: United Steel Corp., Toronto.

BALDWIN
PRODUCTS

Hydraulic presses
Testing equipment
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Diesel-electric locomotives
Diesel engines
Metal plate fabrication
Rolled steel rings
Bronze castings
Heavy machine work
Crane wheels
Bending rolls
Plate planers
Babbitt metal
Alloy iron castings
Briquetting presses

BLW THE BALDWIN GROUP

BALDWIN
SOUTHWARK
HYDRAULIC PRESSES

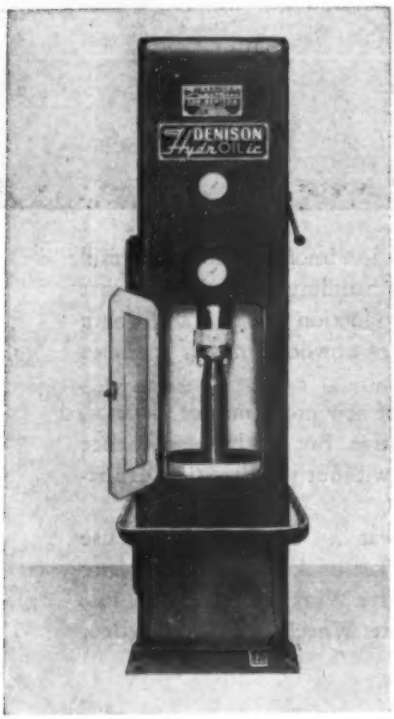
Malta Carbide Tipped Tools Available in Three Grades

Malta carbide tipped tools for cutting steel, cast iron, non-ferrous and non-metallic materials have been produced by Jessop Steel Co., Washington, Pa. They are made in ten styles in a wide range of sizes and three grades of tips: MF for miscellaneous finishing, SF for steel finishing, and CR for coarse roughing. The three grades are distinguished by colored shank ends in red, white and blue respectively. These tools are rust-proofed to protect them in storage.

Denison Test Press Determines Qualities of Metal and Alloy

Denison Engineering Co., Columbus, Ohio, has developed a hydrostatic test press for determining drawing qualities of metals, fatigue in metals and alloys and influence of heat-treatment. Coatings for metals such as paint, enamel and plastic can be tested by alternate applications of pressure, simulating expansion and contraction.

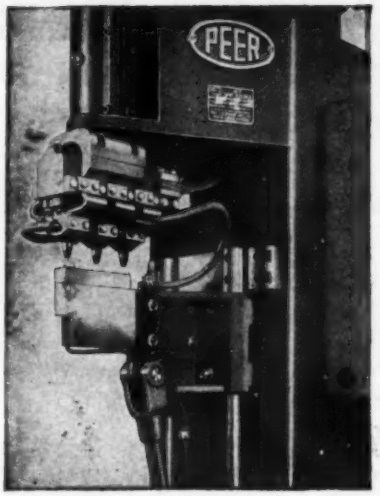
The clamping portion makes it possible to test articles of various heights



Denison hydrostatic test press

without retooling. External pressure may be employed to determine the strength of all types of containers.

This press can be built in various sizes and capacities to suit the particular requirements.



Peer multiple spot-welder

Pier Multiple Spot-Welder Employs a 3-Point Head

The use of hydraulically equalized multiple air-operated spot-welding electrode units is said to speed up fabrication of assemblies requiring a number of spot-welds within close proximity. Pier Equipment Manufacturing Co., 801 Cross St., Benton Harbor, Mich., has employed one of these 3-point heads on a Peer press type welder. By use of this head, it is claimed that the number of operations on a metal box requiring 52 spot-welds was reduced to 14 operations. Accuracy of spacing was accomplished and pressures held uniform by the hydraulic equalization provided in the head.

Curran Aromatic Alkyl Solvent For Metal Washing Machines

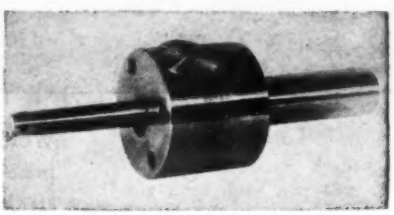
Alkyl aromatic solvent concentrate for metal washing machines has been produced by Curran Corp., Dowling Bldg., Malden, Mass. It is pointed out that this solvent is non-inflammable and non-combustible, has no low volatiles and forms clear solutions with water.

Acme Thread Pick-Up Projector For Presetting Driving Dog

A thread pick-up projector has been announced by Acme Industrial Co., 200 North Laflin St., Chicago 7, Ill. The unit is an optical device for presetting the driving dog on prethreaded work, so that when work is placed in the grinder, the grinding wheel enters the trough of the oversize thread to remove finishing stock from flanks without further adjustment.

Acme thread pick-up projector

This projector accommodates work up to 4½ in. in diameter and 12 in. long, and will operate in conjunction with any thread grinder. The projector screen is ruled with a 60 deg. V plus other graduations to indicate depth of root on A.N. threads. Supplementary graduations on the same screen permit Acme and Whitworth threads to be picked up. Inspection of thread angle and root depth is made in the same setting by means of graduations incorporated in the viewing screen at the top.



Harvey Borset boring head

Harvey Borset Boring Head Has Dial-Set Adustment

For use in screw and milling machines, L. H. Harvey Associates, 254 First Ave. N., Minneapolis, Minn., has available a dial-set adjustable boring head. It is adjustable by means of a 1¼ in. dial calibrated in 25 divisions of 0.001 in. The Borset head is supplied in two sizes: No. 1 for bores from ½ to 1¾ in.; No. 2 for bores from ½ to 2¾ in. Both have 1 in. shanks, but may be obtained with a B. & S. No. 9 taper or No. 3 Morse taper. Two boring bars, for straight and bottom boring, are furnished with each Borset. Bars take a 3/16 in. toolbit.

The dial can be adjusted without removing the tool from the work. A

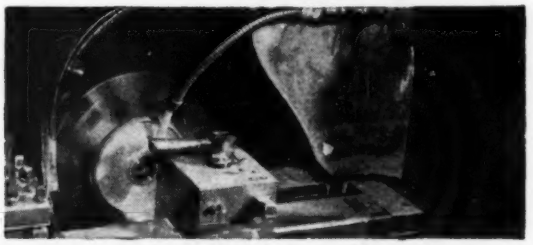
STANDARD CARBOLOY TOOLS
SET THE PACE ON AIRCRAFT PRODUCTION

★ LOW TOOL COST! Standard Carboloy tools, available in 10 styles, 5 grades, wide range of sizes, are priced as low as 70c per tool.

IN the aircraft industry, on thousands of vital jobs, *STANDARD* Carboloy tools have set the pace on machining production! Cutting speeds stepped up as high as six times faster than with former tools! Tool life increased often as much as 20 to 1! Finish, on critical parts, so fine that 75% or more of hand-polishing time is eliminated! Close tolerances once believed "impossible" on mass production work, commonly obtained. Production of vital parts often doubled or tripled.

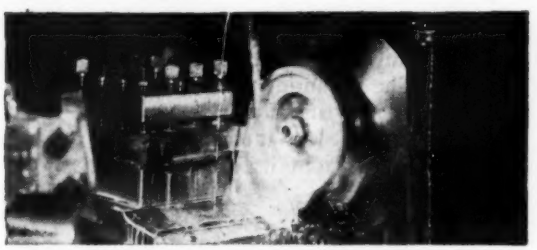
On aircraft manufacture—as well as in all other industries vital to war—*STANDARD* Carboloy tools have helped point the way towards new economies, new production peaks. These tools—at prices comparable to all other cutting tool materials—are available in 10 styles, 5 grades, for cutting *ALL* metals and non-metallics. Write for new catalog GT-175, just issued.

★ HIGH FINISH! On this steel gear, Carboloy tools produce a finish that eliminates 80% of former hand-polishing needed.



★ EXTRA TOOL LIFE! Machining steel gears for superchargers, Carboloy increases tool life 2800% on eleven operations.

★ INCREASED PRODUCTION! Simply by changing to Carboloy tools, in place of ordinary tools, 86% machining time was saved on this job.



★ EXTRA OPERATIONS ELIMINATED! Tooling with Carboloy Standards made possible the elimination of 4 stations on turret—total of 19 tools saved.

CARBOLOY COMPANY, INC.
11149 E. 8 MILE AVE., DETROIT 32, MICHIGAN
Birmingham • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh
Seattle • Thomaston, Conn.

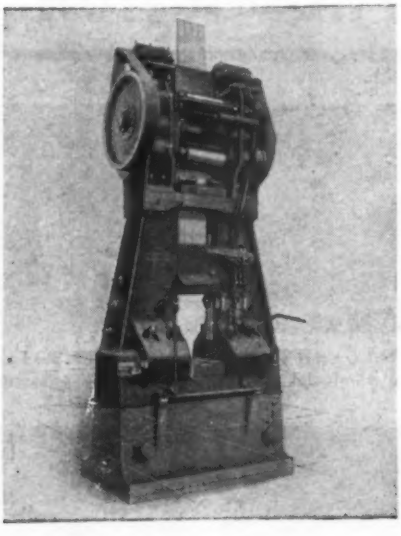
CARBOLOY
TRADEMARK

For Cutting CAST IRON and Non-Ferrous Metals

For Cutting STEEL

TUNGSTEN CARBIDES ★ ★ ★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

lock screw holds the boring bar rigid. When used in a milling machine, the Borset is said to speed production of jigs and fixtures; and reduces set-up time for final boring operation in the screw machine.



Erie board drop hammer

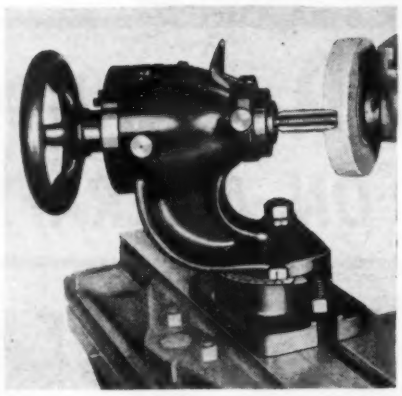
Erie Board Drop Hammer Now Made in 7,500-lb. Size

The largest four-roll board drop hammer ever built by the Erie Foundry Co., Erie, Pa., was recently completed. It is a 7,500-lb. hammer with self-contained motor drive. Previously the largest hammer of this type was the 6,500-lb. size. The machine is so designed that it can be made in a 10,000-lb. size with very few changes. Actual ram weight of this hammer is 7,500 lb. and the anvil weighs 150,000 lb.

On this new design, motors are carried on top of the hammer to eliminate overhanging mountings. Metallic motor cushioning is provided, doing away with the use of rubber. The mounting method also provides greater amplitude of movement and permits the motor to move up and down from its normal position.

Boggis Adapts Grinding Heads For Universal Cutter Grinders

Henry P. Boggis & Co., 1279 West Third St., Cleveland 13, Ohio, has adapted their standard chamfer and flute grinding heads from the Hybco tap grinder for use on any universal tool and cutter grinder. Both grinding heads are arranged to sharpen tools with three different numbers of flutes. They are available in three



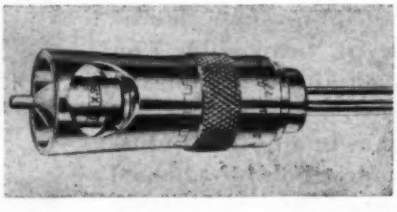
Boggis grinding head

sizes: for tools with shank diameters to 0.500 in., 0.800 in., and 0.500 to 1.250 in.

The chamfer grinding head was designed for sharpening chamfers of taps, but is equally effective for chamfers of other tapered tools having evenly spaced flutes. Eccentric relief, varied as required, is ground on chamfers. It is produced by a compound motion of the tool, which is led forward by cam action as it is rotated against the wheel.

Although useful in maintaining proper cutting edges in straight or angular flutes, the flute grinding head may also be used to sharpen end teeth of end mills.

A feature of these heads is the use of collets to hold tools. This allows repeated grinding and salvaging or converting of broken tools.



Aircraft micro-set stop countersink

Aircraft Stop Countersink Has Simplied Construction

A micro-set stop countersink is offered by Aircraft Tools, Inc., 750 East Gage, Los Angeles 1, Calif. It features simplified construction and compact size. The split collet type shaft allows the use of various cutters and pilots. Sight adjustment is in increments of 0.002 in., and a lock spring in the sight adjusting sleeve holds the locking teeth in set position. A pin locks the stop collar to the shaft.

A spring-loaded spindle retracts the cutter back into the stop cage for safety, thus protecting the cutting edge of the tool and providing increased cutter life. This unit is so constructed that it can be disassembled or reassembled in a few seconds without the use of special tools.

Colonial Cyclodiene Solvent Cleans Magnafluxed Parts

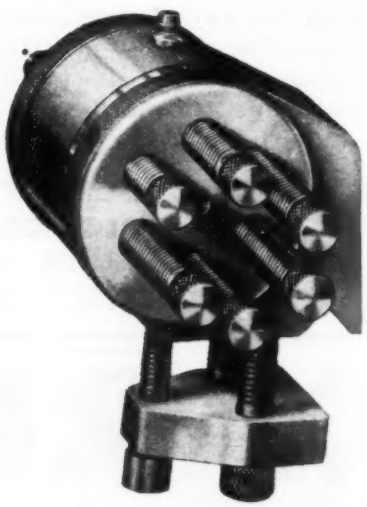
Cyclodiene hydrocarbon solvent has been found suitable as a cleaner for removing oil and dye from Magnafluxed parts according to Colonial Alloys Co., Colonial - Philadelphia Bldg., Philadelphia 34, Pa., maker of the solvent. Cyclodiene can be handled in ordinary open tanks or spray machine at room temperature. It can be used with all metals, including aluminum and magnesium.

Vard Multiple Lathe Stop Fitted With Six Stop Screws

Vard, Inc., 2961 East Colorado Blvd., Pasadena 8, Calif., has designed a multiple lathe stop for a 10 in. South Bend, but adaptable to most V-way lathes within the range of 9 to 16 in.

This lathe stop consists of three parts: the body, which rests on the front V-way; the cylinder, housed into the body and containing adjustable stop screws; and the clamp, which fastens the body to the lathe way.

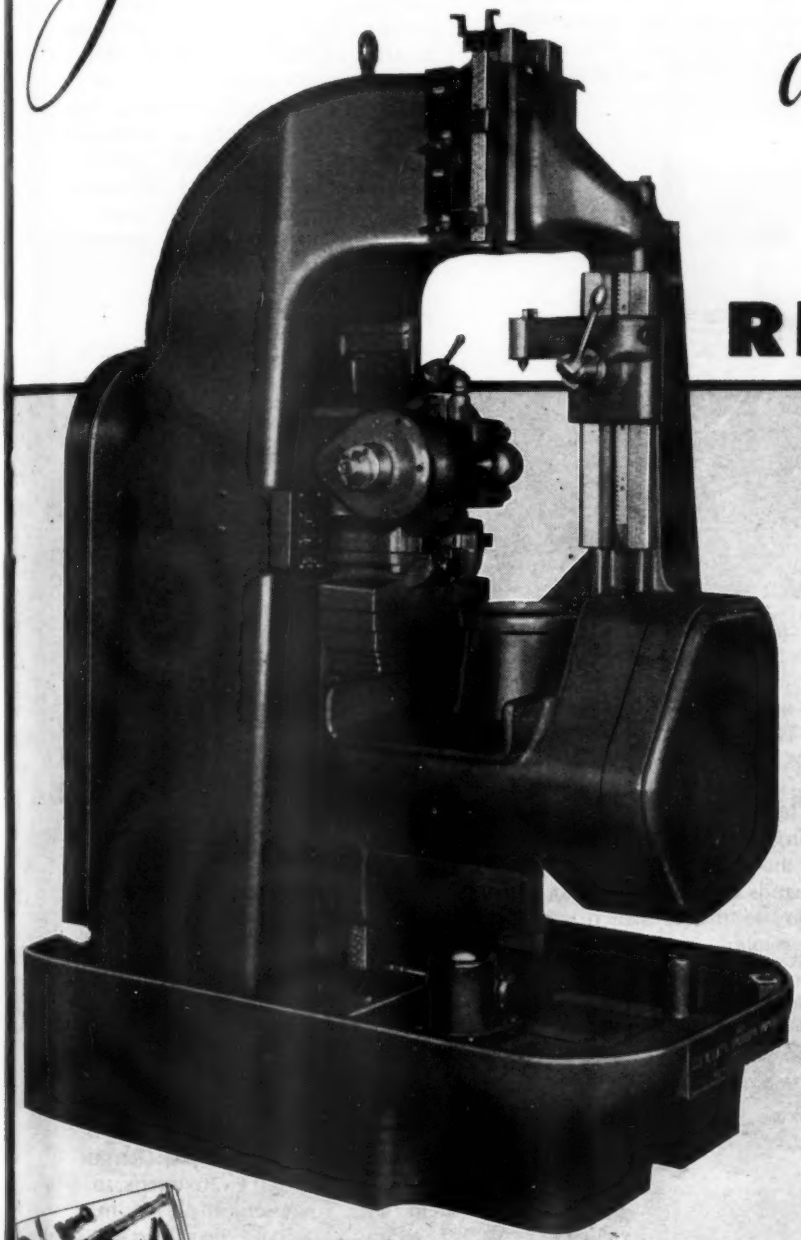
Its rotating cylinder is fitted with six long adjustable stop screws which act against a boss screwed onto the traverse carriage of the lathe. By setting each lathe stop screw to the desired length of carriage travel, six cutting operations in sequence on the work can be established on the first unit. Thereafter an unskilled operator can duplicate the original.



Vard multiple lathe stop

for Precision Hobbed Gears and Splines

THE RIGIDHOBBER



This bulletin explains the Rigidhobber in detail—gives specific information on construction and operation—tells capacities and sizes furnished.

The Rigidhobber presents a high production method for the accurate duplication of spur and helical gears —straight and helical splines. The rigid support to the workhead both above and below the work eliminates spring in either work or hob and assures dependable precision of all work. The hob, on all but very small gears, is supported at the drive end of the hob arbor and by an outboard support.

This rigid support to both work head and hob during entire cutting operation assures the utmost in precision —both on small lots and quantity production.

Bring your hobbing problems to Cleveland Hobbing Engineers for specific information on your job or send sample or blueprint for estimate.

The CLEVELAND HOBBING MACHINE Company

General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

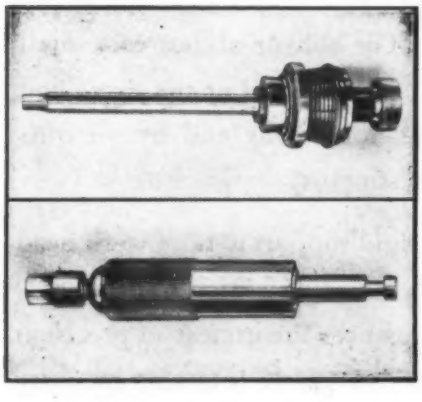
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

DoAll buttress tooth saw

DoAll Buttress Tooth Saw Cuts Non-Metallic Material

For cutting non-metallic materials, DoAll Co., 1201 Thacker St., Des Plaines, Ill., has produced the buttress tooth saw. It can be used on any band saw machine.

Unlike the conventional wood cutting saw, the buttress saw teeth are permanently hardened and are not reshapened or reset. Tooth structure provides ample gullet capacity for removing large quantities of chips.



Invincible valve and bushing tools

Invincible Makes Valve Tools For Auto and Aircraft Use

A tool for removing valve seat inserts from aircraft and automobile motors has been developed by Invincible Tool Co., 6117 Empire Bldg., Pittsburgh 22, Pa. The company is also offering a valve stem bushing remover. This tool removes worn valve stem bushings, facilitating free operation of the valve insert remover. It is said that the remover's evenly distributed jaws give a positive grip on the insert.

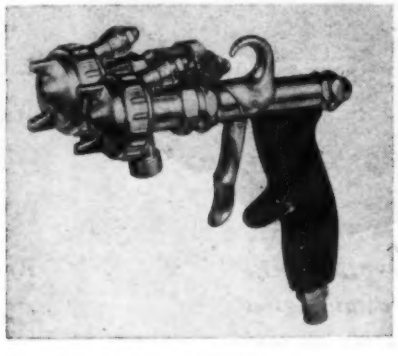
Jaeger Hand Indicator For Measuring Test Speeds

James G. Biddle Co., 1211 Arch St., Philadelphia 7, Pa., has produced the Jaeger speed indicator. It is a vest pocket device which adds up the number of revolutions over a period of six seconds, and shows the revolutions per minute without any calculations.

This instrument has two ratings, one for all speeds up to 2,000 r.p.m.,

Jaeger speed indicator

and the other for speeds up to 10,000 r.p.m. The hands stop automatically at points on the dial which show the average speed during the test interval. The button is pressed prior to measuring, and then pressed again to release the hands for the next test. These hands move only in a clockwise direction no matter which way the spindle rotates.



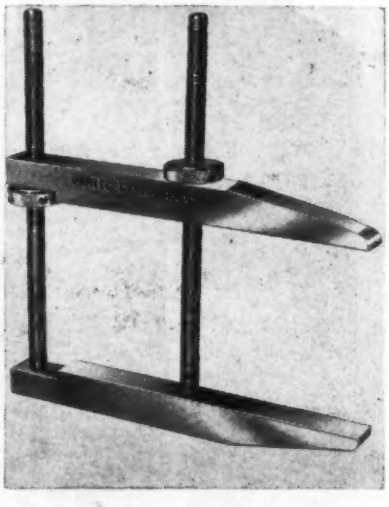
Paasche multi-fluid air brush

Paasche Multi-Fluid Air Brush Mixes Two Materials as Applied

One of the principal uses for the multi-fluid air brush, made by Paasche Airbrush Co., 1909 Diversey Parkway, Chicago 14, Ill., is for spraying of latex and acetic acid. Mixing two or more materials in the air as they are applied to a surface being coated is a feature of this unit.

The needle valve of the fluid assembly connected to the main body of the air brush is actuated by a piston in an air cylinder. Thus simultaneous operation is effected by pulling the trigger. This air brush is also available for three-color or material application. Each color demands an additional atomizing head.

Each spray pattern is controlled individually from small round to wide fan by a calibrated adjustment. When different colors are used, the materials may be applied separately to produce two tone effects.

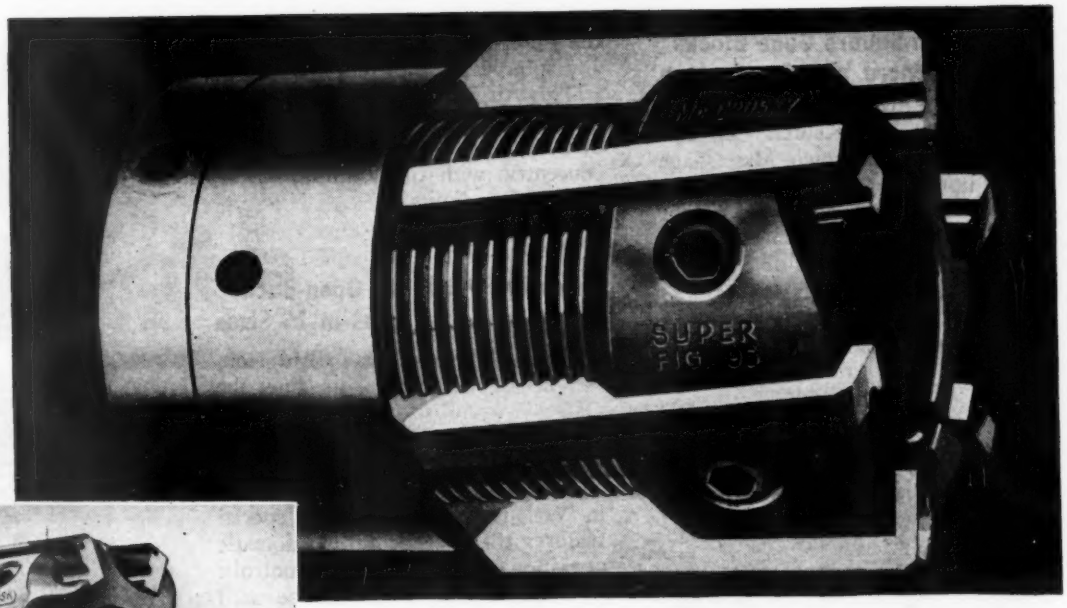


Parlec work-holding clamp

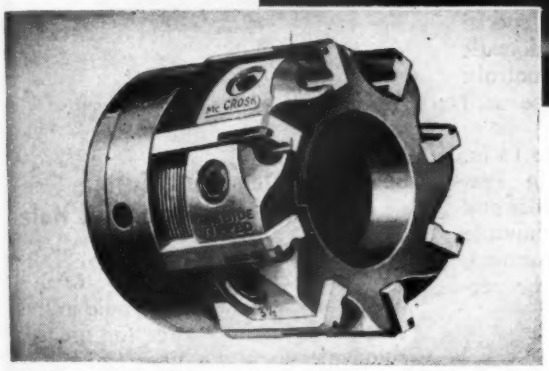
Parlec Work-Holding Clamp Available in Two Models

The Parlec clamp for holding small work together in tapping, drilling, and the like has been produced by Earl C. Parkhurst, 751 Stepney Pl., Inglewood, Calif. The clamp is available in two sizes. Model C-15 opens to 5¼ in. with a jaw length of 6¼ in.; Model C-20 opens to 6½ in. with a jaw length of 7¾ in.

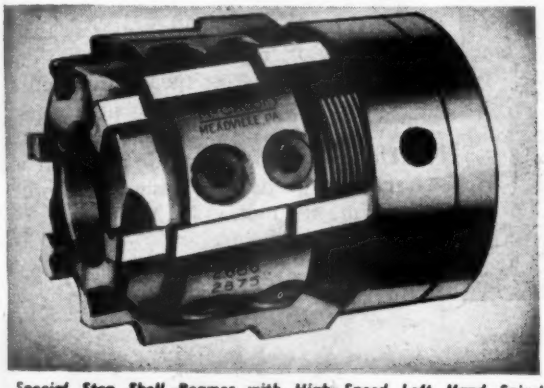
This clamp consists of two steel jaws, two adjustment nuts and two studs. The studs are solidly fastened into the lower jaw of the clamp and one of the nuts is screwed on the rear stud. Then the upper jaw is slid into place on the studs and the other nut is screwed into place on the front stud. Thus the top jaw is movably controlled by the two nuts, the front nut acting as a pivot and the rear nut exerting the gripping pressure. Jaws are tapered on the ends to allow clamping under a shoulder or recess.



McCrosky SUPER Adjustable Shell Reamer with left hand spiral blades and large straight hole for line reaming bars.



SUPER Reamer with cemented carbide-tipped blades. SUPER Reamer design gives full tip support.



Special Step Shell Reamer with High Speed Left Hand Spiral Blades. Reams three diameters and faces two shoulders.

McCROSKY

Super ADJUSTABLE REAMERS

● McCROSKY SUPER Reamers can be adapted for many special jobs. Our Engineering Staff has had long years of experience in developing, from standard design reamers, special purpose reamers which will improve performance and cut costs. Your work prints will enable McCrosky Engineers to submit layouts of Special SUPER Reamers engineered to your job.

Prompt Deliveries

Deliveries of Standard SUPER Reamers can be made from Stock, Decimal diameters shipped within several days, and Special SUPER Reamers now require only from 3 to 5 weeks.

SUPER Chucking Reamer, Fig. 90, with straight shank and L. H. spiral blades.

SUPER Chucking Reamer, Fig. 91, with taper shank and L. H. spiral blades.

The COMPLETE McCROSKY LINE

SUPER Adjustable Reamers
Adjustable Block Boring Bars
JACKLOCK Milling Cutters
Special-Purpose Cutting Tools
WIZARD Quick-Change Chucks
Turret Tool Posts.

ASK FOR BULLETINS

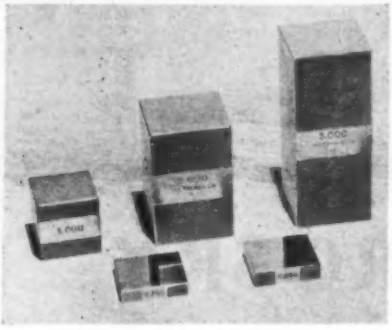
EST. 1904
McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Van Keuren Square Gage Blocks Provide More Wearing Surface

Solid square master blocks have been produced by Van Keuren Co., 176 Waltham St., Watertown, Mass. Gage blocks up to 1 in. in length are 1 in. square, while the 2, 3 and 4 in. blocks are 1¼ in. square. They are made of material with a hardness of Rockwell 68 C.

Owing to the even distribution of wearing surfaces, it is said that the solid square blocks will remain flat and parallel and enable accurate calibration to be made. These master blocks are furnished in sets of 85, 81, or 41 blocks, and also as individual gages.

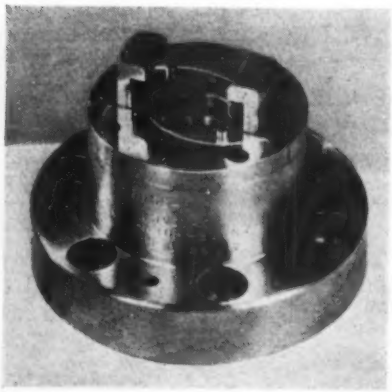


Van Keuren solid square master blocks

Anker-Holth Two-Jaw Chuck Adjustable to Work Thickness

A two-jaw compensating finger chuck is offered by Anker-Holth Manufacturing Co., 332 South Michigan Ave., Chicago 4, Ill. The jaws are so designed that either one may pull in farther than the other to compensate for varying thickness of rough surface work pieces. The chuck body is made for direct mounting on any American Standard spindle nose, but it can be mounted on any spindle by using an adaptor.

This Airgrip chuck is made in various sizes and are furnished for second operation work which must be concentric with the locating surface within close limits.

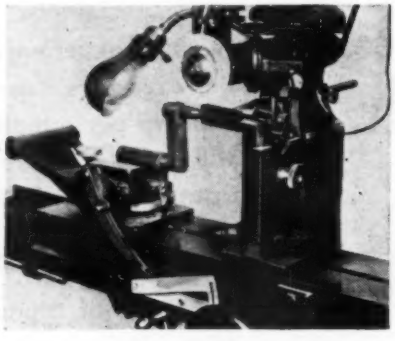


Anker-Holth two-jaw compensating chuck

Ferracute Produces Open-Back Inclinable Press in 15 Sizes

Ferracute Machine Co., Bridgeton, N. J., has added to its line the C36 ½ open-back 150 ton inclinable press. It is available in 15 sizes, ranging from 1¼ to 7 in. diameter shaft. The presses can be furnished in various combinations of special features that permit fully automatic operation, with finger tip controls. If preferred, the press can be used in an upright position.

The stroke ranges from 6 to 13 in. Bed measurement is 50×32 in. Features include built-in ram balance and anti-friction bearings in removable bearing sleeve. Shallow forming, blanking and punching can be performed on this press.

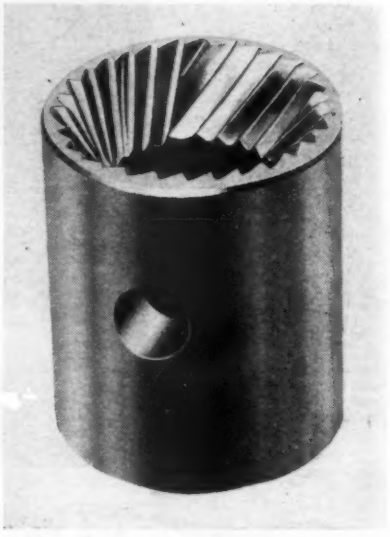


Cleveland tap grinding attachment

Cleveland Tool Attachments Will Handle Any Size Tap

New attachments for use on circular relief grinders of the Cleveland Tool Engineering Co., 1263 W. 4 St., Cleveland 13, Ohio, make it possible to sharpen bent-shank and long lead taps. When thus equipped the circular relief grinder will accommodate any size of ship or boiler reamer or tap.

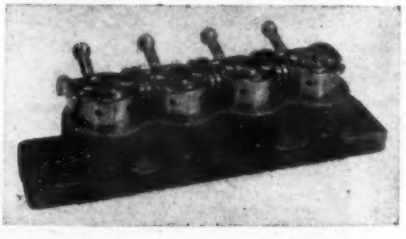
This is made possible through the use of a constant height V-block used in conjunction with an offset center, which centers the tap and holds it in place during grinding. Following the exact outside contour is automatic. Setting an adjustable graduated cam to the correct position, assures equal relief being given to each cutting edge of the tool.



Severance outside deburring cutter

Severance Deburring Cutter Is Made With Coolant Hole

Severance Tool Industries, Inc., 1520 East Genesee Ave., Saginaw, Mich., has incorporated a coolant hole in the outside deburring cutter for use on automatic screw machines and turret lathes in which the tool is stationary and work revolves. This hole is located in the side of the cutter so that the flow of coolant is from the inside of the cutter across the cutting teeth. This direction of flow cools the work and washes chips out of the cutter. The hole also serves for use with a spanner wrench for fastening or removing the tool.



Zagar multiple collet-holding fixture

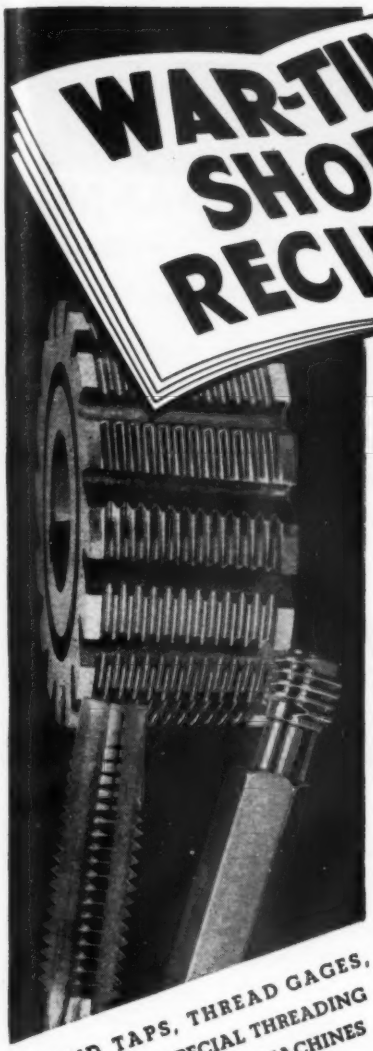
Zagar Collet-Holding Fixture Permits Use of Multiple Units

A multiple collet-holding fixture, consisting of four holding fixtures in either 1 or 2 in. sizes, has been made available by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio. The units can be mounted either parallel with or at right angles to the spindle. Two, three or four collets or multiples thereof can be used.

Center to center of collets is 3½ in. on the 1 in. fixtures, and 5½ in.

WAR-TIME SHOP RECIPES

Now Available



GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES

THREAD MILLING CUTTER
A pocket Manual for sharpening THREAD MILLING CUTTERS
and sharpening hints
DETROIT
TAP & TOOL CO.
8432 BUTLER DETROIT 11 U.S.A.

Includes:

1. Sharpening Instructions
2. Conversion tables (Rake angles & hook)
3. How to compute offset distances
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BUY U.S. BONDS STAMPS

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8432 BUTLER
DETROIT 11,
MICH., U.S.A.

on the 2 in. fixtures. Two fixtures can be staggered, however, reducing the distances to 1¾ and 2¾ in. respectively.

Willson Offers MonoGoggle With Replaceable Plastic Lens

An all-plastic single lens goggle is offered by Willson Products, Inc., Reading, Pa. This MonoGoggle weighs 1¼ oz., and is designed to provide high impact strength. It has a replaceable, crystal-clear lens and can be worn with prescription glasses.

New Britain Rethreading Die Reconditions Damaged Threads

An axle rethreading die has been made available by New Britain Machine Co., New Britain, Conn. It is made for reconditioning abused threads. No. M-460 die handles thread sizes for passenger cars, while No. M-461 die is suited for threads for trucks. Both dies are 11 in. in length.

To operate the rethreader, the die is placed over the thread, the handle is turned to tighten the die and then backed off. In many cases, it is claimed these die sets can reclaim threads that seem hopelessly damaged.

New Britain axle rethreading die

Both sets are finished in cadmium plate with a black enameled frame. They are packed in black enamel cases with sliding closure.

Parts and Materials

Paraplex Resin Plasticizer Is Resistant to Oil and Heat

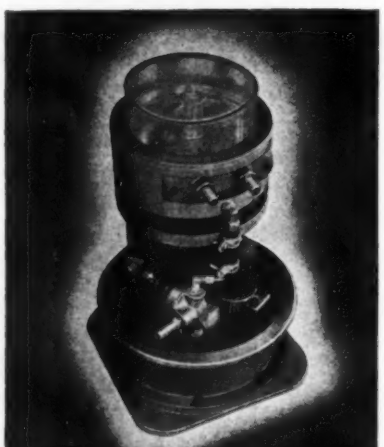
Paraplex G-25, a resin plasticizer, has been produced by Resinous Products & Chemical Co., 222 West Washington Sq., Philadelphia, Pa. It is supplied as a soft, tacky, viscous liquid which pours slowly at room temperature. It is said to possess resistance to oils, gasoline and heat, and has been found useful in polyvinyl chloride cable compounds and cable lacquers, wire enamels, vinyl resin fabric coatings, hot-melt compositions, and aircraft gaskets and caulking and sealing compounds.

This material shows the following properties:

Specific gravity	1.06
Acid number	3.0 (maximum)
Color	15 (maximum)
Odor	Faint, characteristic
Freezing point	13-15 C.
Viscosity	(50 percent in ethylene dichloride) Q-V (Gardner-Holdt scale)

Los Angeles Standard Rubber Offers General Purpose Stock

A general purpose stock for use in oil seals, gaskets, O rings and other types of fuel seals and parts that require resistance to heat and oil is offered by Los Angeles Standard Rubber, Inc., 1500 East Gage Ave., Los Angeles, Calif. This Buna N stock, 143-18, is flexible to 35 deg. below zero.



Dynatrol current interruptor

Sciaky Dynatrol Interruptor For Inductive D.C. Circuits

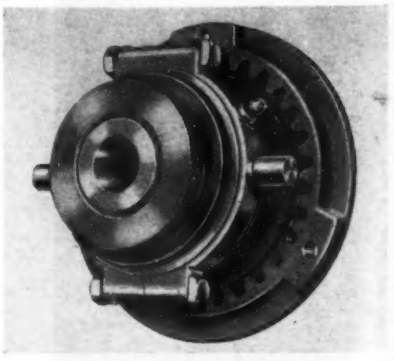
The Dynatrol, a device for high-speed, arcless current interruption of inductive direct current circuits, has been developed by Sciaky Bros., 4915 West 67 St., Chicago 38, Ill. It is designed to interrupt charging current without arc and thus reduce maintenance, and because of shorter charging time it is claimed that 20 percent greater operating speed is provided. The Dynatrol is available on all Sciaky stored energy welders up to and including 50 kw.

It is essentially a high-speed, single pole interruptor, the contact points of which are shunted by a bank of capacitors. The movable contacts open with a high acceleration, so that at any instant they have separated sufficiently to prevent a discharge while the primary current is directed to the capacitors.

Dodge Makes a Rolling-Grip Friction Clutch in Two Sizes

A rolling-grip friction clutch for use where power requirements are relatively small is available from Dodge Manufacturing Corp., Mishawaka, Ind. This disc clutch is said to be rugged, easy to operate and simple to adjust. It is to be made with a 3½-in. diameter disc, rated at ½ hp. at 100 r.p.m., or with a 4½-in. diameter disc, rated at 1 hp. at 100 r.p.m.

This clutch has no toggles, but has a number of highly polished hardened steel balls which are forced



Dodge rolling-grip clutch

All These Needle Bearings are Quickly and Easily Installed

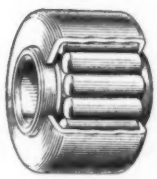
TYPE DC

TYPE FDT

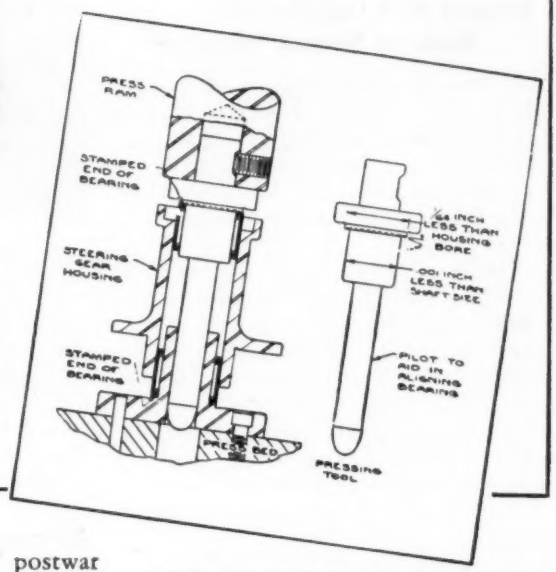
TYPE AT

TYPE NCS

TYPE RC



TYPE PN



A simple arbor press is the only equipment required to install Torrington Needle Bearings.

UNIT CONSTRUCTION AND SIMPLICITY OF DESIGN FACILITATE ASSEMBLY LINE PRODUCTION METHODS

One of the outstanding features of Torrington Needle Bearings is the ease and speed with which they are installed. Because of their unit construction, handling and assembly or dis-assembly of associated parts or mechanisms are simplified.

Furthermore, the compact design characteristic of these Torrington Needle Bearings makes possible the use of simpler housing structures. In virtually all cases a bore, machined to proper dimensions, is all that is required to hold the bearing. An arbor press (with properly designed pressing tool) is the only equipment necessary to secure correct installation in practically any application.

And properly installed, in correct press fit, Needle Bearings will not shift or creep—eliminating the need of locking-rings or spacers.

All these installation features contribute to speed and efficiency that result in cost economies on the production line. They are helping today in meeting production schedules; will similarly aid "tomorrow's" postwar production lines.

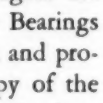
It will pay you to investigate the many advantages of Needle Bearings in terms of your own design and production requirements. A copy of the Torrington Needle Bearing Catalog, available on request, will give you more complete information. Ask for Catalog No. 115. And the services of our engineering department are available to aid you in the selection and application of Needle Bearings for any particular job.

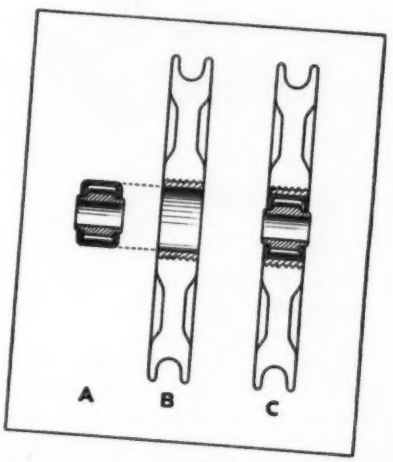
THE TORRINGTON COMPANY

Established 1866 • Torrington, Conn. • South Bend 21, Ind.

"Makers of Needle Bearings and Needle Bearing Rollers"

New York	Boston	Philadelphia
Detroit	Cleveland	Seattle
San Francisco	Chicago	Los Angeles
Toronto		London, England





PN Type Torrington Needle Bearing is installed in aircraft pulley by simple press fit.

TORRINGTON
NEEDLE BEARINGS

into a V-shaped groove by a hardened steel cam. Forcing the balls toward the center of the shaft widens the Vee. There are no links, pins, cotters or other highly stressed mechanical parts.

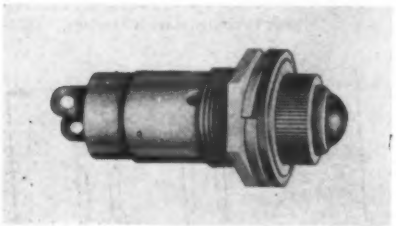
Adjustment of the clutch is controlled by a threaded collar locked in place by two setscrews.

Gothard Pilot Light Series Made in Several Variations

A series of pilot lights known as Series No. 1110 is available from Gothard Manufacturing Co., Springfield, Ill. Primarily for undergrounded panels, all variations of this light are equipped with two solder terminals.

Models No. 1110, faceted jewel, and No. 1111, plain jewel, take long bulbs; while No. 1112, faceted jewel, and No. 1113, plain jewel, take round bulbs. These models are available with bayonet sockets only.

This pilot light is also available as a shutter type light for such applications that require variable intensities. A 90 deg. turn of the shutter



Gothard pilot light

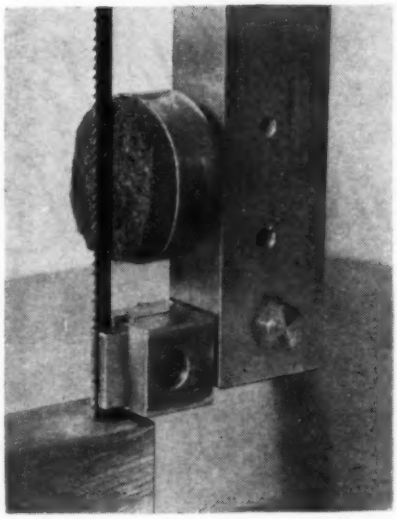
provides gradation from bright light, through intermediate glows to a dim glow or total blackout.

Shutter types, Models No. 1114 and 1115, provide for round bulbs. They can be furnished with polarized lens. All models mount in an 11/16 in. hole and have ½ in. jewels.

Grob Self-Seating Saw Guide Equipped With a Felt Oiler

A self-seating band saw guide has been manufactured by Grob. Bros., Grafton, Wis. This unit is made from aluminum bronze, Rockwell C-34. It is said that long life of the guide is assured by a felt oiler mounted directly above the upper guide.

The maker claims that this self-seating guide permits heavier pressure to the saw blade thereby providing faster cutting, does away with destroying the saw blade from the rear, provides close support immediately above and below the work, and compact design permits better vision of the work.



Grob self-seating saw guide

Airtemp Refrigeration Unit Designed for Liquid Cooling

An air-cooled 1½ hp. refrigeration unit for cooling resistance spot-welders, and for other specialized industrial liquid cooling service, has been designed by Airtemp Div., Chrysler Corp., Dayton, Ohio.

The cooling unit is self-contained and is equipped with an Airtemp hermetically sealed radial compressor. It has ample capacity to cool all types of resistance spot-welders when handling aluminum or ferrous metals.

A counter-flow liquid cooler is mounted in the base and an insulated storage tank is equipped with a ¾ hp. pump having a nominal capacity of 6 gal. per min. Location of the liquid cooling unit in the base is said to eliminate losses of coolant employed at the time of changing tips as the liquid drains back to the storage tank. A pressure regulating valve provides flow of coolant at a constant pressure.

Cylinder liners are removable and interchangeable, and each cylinder is protected by a suction strainer. The motor is equipped with a magnetic across-the-line starter, and has built-in overload and low voltage protection with external hand reset.

The condenser is equipped with a 16-in. propeller type fan which permits operation of the unit at high ambient temperatures. Starting and selector switches are mounted on the outside of the cabinet, and a flush-mounted door gives access to the condensing mechanism.

A high pressure cut-out is provided in this refrigeration unit, and a remote bulb thermostat having a temperature range from −20 to +20 F. controls temperature of coolant.

Hercules Cellulose Derivative Provides Emulsifyng Agent

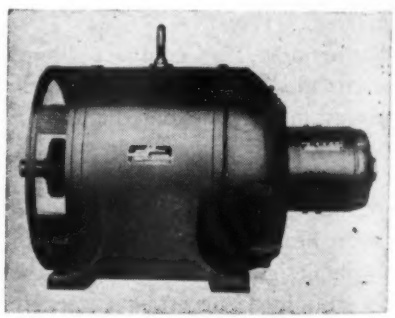
Sodium carboxy-methyl-cellulose, a cellulose derivative which is soluble in water, is available from Hercules Powder Co., Cellulose Products Dept., Wilmington, Del. Now in small-scale production, the chemical is available in experimental quantities only. Properties of the material make it a stabilizer and emulsifying agent.

Some of its possible applications include an emulsifier for paints and lacquers and to provide a protective colloid for oil-in-water emulsions.

Sodium carboxy-methyl-cellulose is supplied as a white, granular powder, odorless and readily soluble or dispersible in water. It is said that viscous, stable aqueous solutions can be obtained with it.

Century A.C. Generator For Gas Engine Drive Use

Century Electric Co., 1806 Pine St., St. Louis, Mo., has produced an alternating current generator for gas engine drive. The unit is available in

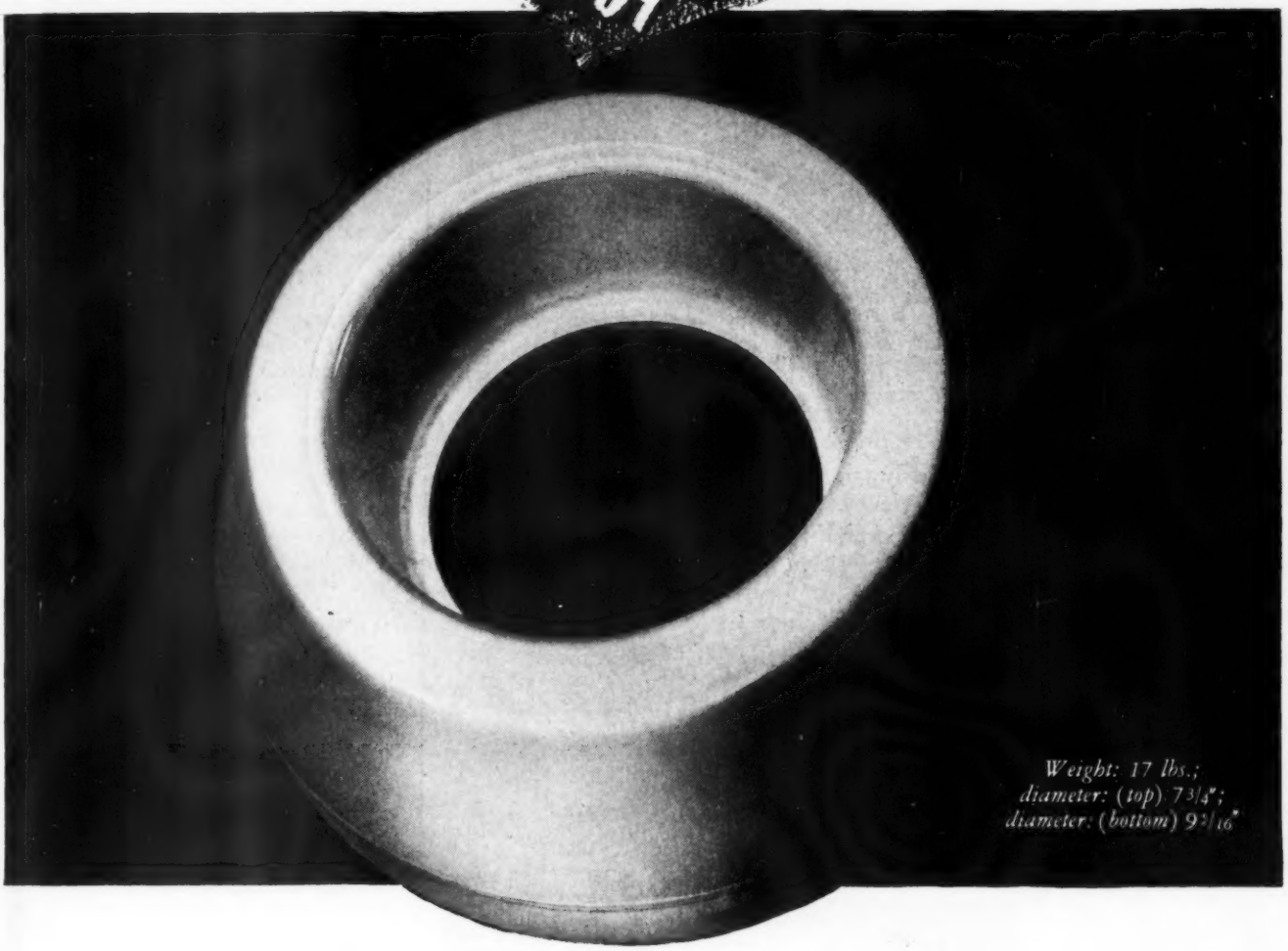


Century a.c. generator

sizes ½ to 150 kva. for direct connection or belted drives.

The exciter is mounted on the end of the generator opposite the engine. The exciter shaft is inserted in and keyed to the generator shaft on the inner end, and the generator bearing carries the exciter. A compact power unit is formed by arrangement of the generator, exciter and engine.

ALUMINUM DIE-PRESSED FORGING by REVERE



The cylinder barrel muff which we illustrate is typical of the strong close-grained, die-pressed aluminum forgings in which Revere has pioneered so successfully—especially in the aviation industry.

This particular cylinder barrel muff is used in certain types of radial aircraft engines and with special success in one of the famous engines extensively used by the Navy. When finally machined, the resultant thin fins reach almost to the core of the cylinder itself and provide an unusually large cooling surface.

Revere forgings are also available in copper, various copper-base alloys and magnesium. Almost any shapes and sizes can be had, even those ordinarily pronounced "impractical" or "impossible".

Revere will be glad to offer—*without obligation*—technical advice on any special problems you may have in die-pressed forgings. Write Revere Executive offices.

FREE! A 54 page manual, "Revere Copper and Copper Alloys—Technical Information for Product Designers," with 106 graphs relating to physical and metallographic properties under varying conditions; also, a new, easy-to-read chemical and physical properties chart, with pertinent illustrated information on Revere manufactured forms and welding technique. A complimentary copy sent you upon request. Address: Executive Offices.

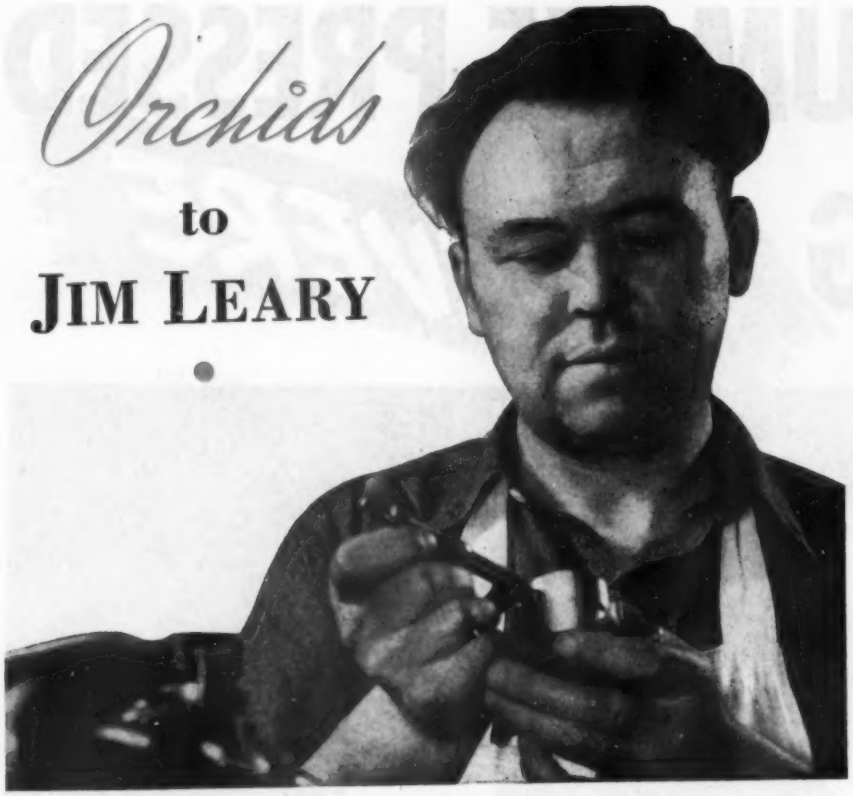
REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York 17, N. Y.

Orchids to JIM LEARY



We at Turner are justly proud of Jim Leary. First, because he has had a perfect attendance record since he started to work for us on September 20th, 1941. Second, because his skill in grinding has made it possible for us to produce precision gauges that help to speed up production on war material.

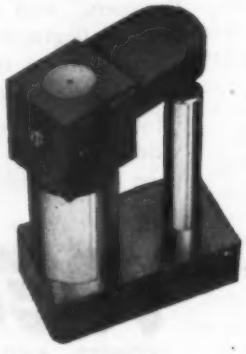
Yes, there are other "Jim Learys" in our plant who take pride in their work, that's why we have been able to maintain the highest standards in the manufacture of gauges, even during these days of labor shortages.

Look for this stamp of precision. It is your guarantee of a Turner Precision Made Gauge.

TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY

2625 HILTON ROAD • • FERNDALE, MICHIGAN



The Turner Special gauge to check the base of cartridge cases.

Turner manufactures many types of special gauges to your specifications.

TRADE PUBLICATIONS

ACCESSORIES Form MTC-943 has been published by the Machinery Products Div., Ideal Commutator Dresser Co., 1290 Park Ave., Sycamore, Ill. This twelve-page, illustrated bulletin contains complete information on a number of entirely new Ideal machine tool accessories.

BEARINGS Reliance snap, bearing, lock and retainer ring engineering folder No. 43 has been released by the Eaton Manufacturing Co., Reliance Div., Massillon, Ohio. It covers engineering data on rings for S.A.E. standard bearings, housing and shaft applications plus engineering, designing and purchasing information.

BI-METALS Bulletin No. 155 recently released by the Callite Tungsten Corp., 540 Thirty-ninth St., Union City, N. J., gives technical data on the deflection and power of various types of "Calliflex" thermostatic Bi-Metals in strip and coil, as well as information on thicknesses and sizes.

CARBIDE TOOLS The Tungsten Carbide Tool Co., 2661 Joy Road, Detroit 6, Mich., announces Bulletin No. 44-2 containing specifications, prices, and a grade selection table covering standard tips which are available from stock.

CARBIDE TOOLS Price List No. FE-109 on standard and non-standard tips and Price List No. FE-110 on stock general purpose tools superseding previous lists and discounts are announced by Firth-Sterling Steel Co., McKeesport, Pa.

COLLET CHUCKS Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio, has issued a brochure on its index and holding fixtures. In addition to showing actual installation photos, it tells of advantages to be gained through the use of these fixtures.

COMPRESSED AIR DRYING Bulletin 543A, announced by the Logan Engineering Co., Chicago, Ill., is a twelve-page folder describing the action of the Aridifier in removing moisture, dirt and oil from compressed air in any type of installation.

COMPRESSORS Available from Schramm Inc., West Chester, Pa., is Catalog 4215 which illustrates and describes in complete detail the No. 60 type of compressor in various mountings for construction and engineering fields, railroads and small industrial installation.

CUTTING "How to Cut Metal Like Cheese" is the title of a new four-page, illustrated folder giving complete in-

formation on the advantages, uses, types and speeds of fast-cutting Radiac abrasive cut-off machines and abrasive cut-off discs available from A. P. de Sanno & Son, Inc., Machine Sales Div., Dept. 110, 106 South 16 St., Philadelphia, Pa.

CUTTING OILS "Soluble Cutting Oil At Its Best" is the title of a 20-page booklet of the D. A. Stuart Oil Co., 2729 South Troy St., Chicago 23, Ill., which discusses typical problems involved in the selection and application of water-mix oils.

ELECTRICAL EQUIPMENT A 28-page, illustrated booklet of convenient pocket size entitled "Care and Maintenance of Electrical Equipment" and containing simple instructions for keeping switches, paelboards and switchboards in good operating condition may be secured from the Square D Co., 6060 Rivard St., Detroit 11, Mich.

GAGES Haines Gauge Co., 2301 West Allegheny Ave., Philadelphia 32, Pa., has published a bulletin featuring a wide variety of made-to-specification precision gages. Requests for copies should be made on company stationery.

GEAR PULLER The new Britain Machine Co. has published an announcement which describes the line of gear pullers now available for distribution. Address: P. O. Box 1320, New Britain, Conn.

GRINDERS The complete line of Hisey electric drills, grinders and buffers and attachments and accessories are contained in Catalog 70 which covers such pertinent information as their outstanding features, range of sizes, types, operation, and ordering instructions. Available from the Hisey-Wolf Machine Co., Cincinnati, Ohio.

GRINDING WHEELS. Important facts about diamond impregnated grinding wheels, their recommended uses, economical operation, proper maintenance, etc., are offered in a 32-page question-and-answer type booklet offered by the Plant Service Dept., Larco Diamond Tool Co., 551 Fifth Avenue, New York 17, N. Y.

HARD RUBBER The qualities of hard rubber, which make it important as an engineering material, are described in Catalog Section 9405 issued by The B. F. Goodrich Co., Akron, Ohio. Included are data on the application of hard rubber, products which can be manufactured from it, machining, properties of the various types, and dimensions and weights of sheets, rods and tubing.

HAND TOOLS The line of air tools for drilling, riveting, grinding and other small tool applications is de-

DO YOU NEED GAGE BLOCKS IN A HURRY?

These Ellstrom made Chromium Plated Gage Blocks are now being delivered reasonably fast to those manufacturers who are doing vital war work.

The photograph above shows Set No. 81 containing 81 blocks ranging from .050 to 4 inches in size. There are other Dearborn Gage sets available, a complete description including prices of these will be sent to you upon request. Wire or write us today or contact your nearest Dearborn representative.

DEARBORN GAGE CO. 22038 BEECH STREET DEARBORN, MICH.

Originators of Chromium Plated Gage Blocks

Shop where Hjalmer Ellstrom developed the original gage block.

CHICAGO

MOUNTED WHEELS and SMALL GRINDING WHEELS

A complete range of styles, grains and sizes up to 3" in diameter to give you a perfect finish on every job.

PROMPT DELIVERY

Specialization — with full WPB approval — on sizes 3" in diameter and under, means no waiting for Chicago Grinding or Mounted Wheels. Let us take care of your present and post-war requirements.

YES, YOU CAN FINISH IT BETTER WITH A CHICAGO WHEEL

FREE ENGINEERING ANALYSIS

If you have a grinding job that presents a problem because of the nature of material, tricky shape or other reason, tell us about it. Our experts will go into a huddle and give you the benefit of our long experience making millions of custom built wheels for every conceivable operation.

Just as the prelude to a new world is better tools of war, so the prelude to a perfect finish is better grinding wheels.

Today's standards of finishes are far and beyond those of yesterday. To acquire them without sacrifice of production time is a goal which everyone seeks.

Finish must now be measured in micro inches. That's where the new Chicago FV BOND Wheels excel. They give a precision smoothness so intensified that it passes any surface analyzer test, in many cases eliminating hand lapping and auxiliary finishing operations.

HERE'S WHAT MAKES CHICAGO WHEELS CLICK—

A—Sensational new FV BOND. Result of research and experiment on hundreds of aircraft jobs.

B—No sacrifice of cutting time or wheel life.

FV BOND is available in all types of Chicago Mounted and Small Grinding Wheels—in all abrasives, grain and grade combinations.

TEST WHEEL FREE — To prove their superiority in your own shop, send for a Chicago Wheel made with FV BOND. Give us details of the job, material you want to finish and we'll do the rest.

Write for Catalog and interesting Engineering Survey Form

Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Abrasive Industry.

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. AT, Chicago 7, Ill.

Send Catalog and ... vey Form. Interested in
☐ Grinding Wheels
☐ Mounted Wheels
☐ Send Test Wheel
Name ...
NAME
ADDRESS

scribed by Ingersoll-Rand, 11 Broadway, New York 4, N. Y., in a new booklet (Form 5100) which gives complete data on the features, sizes and operation of these tools.

HEAT TREATING Sixteen interesting uses of high frequency electrical induction are featured in a new, well-illustrated 32-page booklet entitled "Results With TOCCO," published by The Ohio Crankshaft Co., Cleveland 1, Ohio.

HOLE PUNCHING Catalog "PS" describes a new time-saving development in hole punching—the Wales plate set system. Available from the Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y., this illustrated booklet contains 20 pages of information covering the features, operation, prices and sizes, accessories, and ordering instructions of this system.

HOLE PUNCHING UNITS Catalog "E" which illustrates and describes Wales Type "E" hole punching units is available from the Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. Those concerned with the problem of punching a series of holes simultaneously in extruded and shaped sections will find this bulletin helpful.

HYDRAULIC PRESS The Charles E. Francis Co., Rushville, Ind., have issued Bulletin L-1 on their all-purpose press for plastics, rubber, compreg wood, laboratory use, and other production work.

HYDRAULIC UNITS BARNESDRIL standard hydraulic units arranged vertically, angularly or horizontally for special drilling, reaming, facing, boring or tapping operations are illustrated and described in Bulletin 150 now available from the Barnes Drill Co., 814-830 Chestnut St., Rockford, Ill.

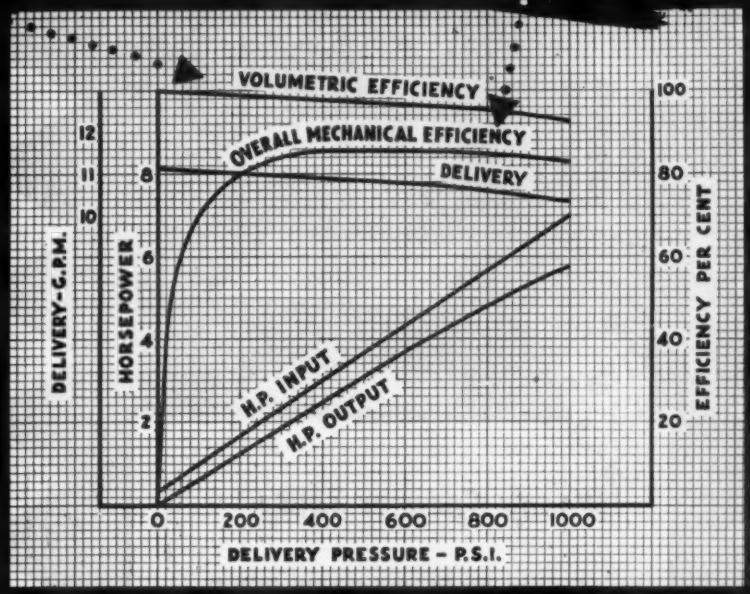
INSULATION TESTER The Herman H. Sticht Co., Inc., 27 Park Place, New York 7, N. Y., have released a new bulletin (No. 445) describing their new model C-2 Megohmer for making insulation resistance measurements.

LUBRICATION Gear lubrication problems and their handling are discussed in a booklet offered by E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa. It illustrates and describes various types of gears, proper types of lubricants for gear sets, headstocks, open gears and worm gears. Also general instructions on proper lubrication maintenance.

MANAGEMENT Elliot Service Co., 219 East 44 St., New York 17, N. Y., offers a booklet which gives foremen and supervisors specific methods and concrete suggestions for the most effective use of the men, machines and

HIGHER VOLUMETRIC EFFICIENCY...

HIGHER MECHANICAL EFFICIENCY...



Typical curves shown are for V-104-D pump at 1200 rpm; curves for other models are similar. Above curves are for oil having viscosity of 150 S.S.U. at 100° F., temperature of 120° F.

VICKERS
BALANCED Vane Type PUMPS

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

These performance curves merit careful consideration when selecting constant delivery pumps for oil hydraulic power and control systems. The overall mechanical efficiency is extremely high throughout the important working pressure range. Note that pump delivery and efficiency are not reduced appreciably as pressure is increased. These features, together with the 1000 psi continuous working pressure that is possible, effect an important reduction in pump size and cost. This higher working pressure also means a substantial saving in first cost and in space occupied by cylinders, valves, piping, tank, etc. for a given speed and power.

Other important advantages of Vickers Balanced Vane Type Pumps include: (1) Hydraulic Balance which cancels out bearing loads and means much longer pump life, (2) cartridge assembly contains all pumping parts that move and is important to the simplicity, easy inspection and minimum maintenance of these pumps, (3) compact, yet rugged, (4) automatic wear take-up, (5) temperature adaptability, etc. Ask for Bulletin 40-25a for all the facts about Vickers Balanced Vane Type Pumps.

Vickers Application Engineers will gladly discuss with you how Vickers Pumps and Vickers Hydromotive Controls can be used to advantage.

VICKERS *Incorporated*

1410 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES
NEWARK • PHILADELPHIA • ROCKFORD • TULSA • WORCESTER

Woody Spencer says:
"GET THE RIGHT TAP FOR THE JOB"
Many tapping troubles today are the result of the wrong style of tap being used. Write us giving complete details and we will be glad to make suggestions based on our years of experience in tapping problems.
The Wood & Spencer Company
Cleveland 3, Ohio

materials on hand. Planning of work, study and improvement of job methods and employee cooperation are some of the important subjects covered in this useful booklet.

MANAGEMENT "Telling Employees About Their Company," "Recruiting Women Workers" and "The Employee Counselor in Industry" may be secured from the Metropolitan Life Insurance Co., Policyholders Service Bureau, 1 Madison Ave., New York 10, N. Y., by business executives concerned with personnel problems. Requests must be made on company stationery.

MEEHANITE CASTINGS The Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y., has published a new 8-page Bulletin No. 17 entitled "A Study of Friction, Galling and Seizing" developed as a result of recent study into the reactions of surfaces in contact with one another. Complete descriptions of test methods, test result charts and tabulations of conclusions are included.

MOTORS Century Electric Co., 1806 Pine St., St. Louis 3, Mo., offers Form 3421 on their direct current motors ranging in sizes from 1/6 to 300 hp. Fully illustrated the booklet gives complete data on sizes, types, features, operation and performance.

OPTICAL COMPARATOR CHARTS Engineers Specialties Div., The Universal Engraving & Colorplate Co., Inc., 588 Monroe St., Buffalo 11, N. Y., offers Bulletin 1-44ER, covering charts, rules, scales and discs, and a companion booklet "Specifications and Prices" listing models of better known optical projectors or comparators, sizes and prices.

PATENTS A leaflet announcing the completion of a project for publishing abstracts of 7,000 foreign-owned United States chemical patents may be secured from the Office of Alien Property Custodian, Chicago 3, Ill.

POWER TRANSMISSION The part WHS speed reducers, gears and transmission machinery is playing in our war production program as well as their peacetime applications is the theme of a new booklet issued by Winfield H. Smith, Inc., Springville, Erie County, N. Y.

PRESSES, BULLDOZERS AND SHEARS Beatty Machine & Manufacturing Co., Hammond, Ind., has issued a looseleaf compilation of bulletins covering their hydraulic equipment—hydraulic extruding presses, high speed presses and press brake and flanging machines for heavy plate bending and flanging—and on their mechanical driven bulldozers and forging equipment, punching and shearing machines.

REAMERS Catalog No. 44 covering a complete line of adjustable inserted blade reamers, boring bars and special tools has been published by the Wetmore Reamer Co., 418 North 27 St., Milwaukee 8, Wis.

REDUCERS The D. O. James Manufacturing Co., 1140 West Monroe St., Chicago, Ill., is offering a 376-page catalog (No. 1000R) covering speed reducing transmissions of various types.

RESISTANCE-WELDER CONTROL A two-page folder (Bulletin 75-51-50) just issued by Weltronic Co., 20735 Grand River Ave., Detroit 19, Mich., covering features, specifications and functions of the Weltronic synchronous resistance-welder control, Model No. 75-51-50, designed to permit complete control of operations on spot welders using air or hydraulically actuated electrodes with solenoid operated valves.

RIVETING A new manual—No. B-44—has been issued for distribution by the Cherry Rivet Co., 231 Winston St., Los Angeles 13, Cal. This booklet is illustrated in color sketches, diagrams and tabular material, and explains in detail every phase of the Cherry Rivet Process.

ROTARY PUMPS "Facts about Rotary Pumps" is the title of a new four-page bulletin announced by the Blackmer Pump Co. Features of design, operation and application of this company's pumps are discussed in this attractive folder available from Willis S. Martin, Advertising, Lincoln Tower, Fort Wayne 2, Ind.

SHEET METAL DATA BOOK Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich., has issued a catalog describing their Uni-Wash dust collectors, spray booths, metal parts washers, ovens and other sheet metal equipment. Fully illustrated, it includes cutaway drawings of equipment mechanism and size and capacity charts as well as 36 pages of engineering data for engineers working with sheet metal. Requests must be made on company letterhead.

SLINGS A 72-page catalog showing various types of slings is offered by John A. Roebling's Sons Co., 640 South Broad St., Trenton 2, N. J. It gives data on wire rope and grommet slings for standard and special uses, information on the new Roebling "Flatweave" sling, and discusses various types of wire rope fittings used with slings.

STAINLESS STEELS Stainless steel plays an important part in the food handling and processing industries. The story of how, why and where it is used is told in a booklet "Stainless Steel in the Food Handling and

WARNING
to All Steel Users

Avoid Dangers of High Inventories

Here are the facts . . . Many companies in the metalworking industries have recently experienced cutbacks in war contracts and there is some evidence of planning for partial reconversion to commercial production. As a result, a number of manufacturers are already circulating lists of odd steel stocks and excess inventories. More lists will appear as cancellations, design changes and manufacturing trends follow the tide of war.

While there is no real surplus of steel at the present time, there are sound reasons for a conservative buying policy. First, you will help war production by making steel available to those who need it immediately. Second, it is good business to keep your inventory at a practical working level.

Steel overstocks may be dynamite. Cancellation of a contract or a change in design can overnight leave you with an excessive or obsolete steel inventory. There was a time when this conservative inventory policy might not have been sound from a production standpoint. However—most warehouse stocks have been built up so they now can quickly meet any demand. Ryerson is particularly well suited to serve your day to day or emergency steel requirements. Large and complete stocks on hand for immediate shipment provide a safe, dependable source for every steel need.

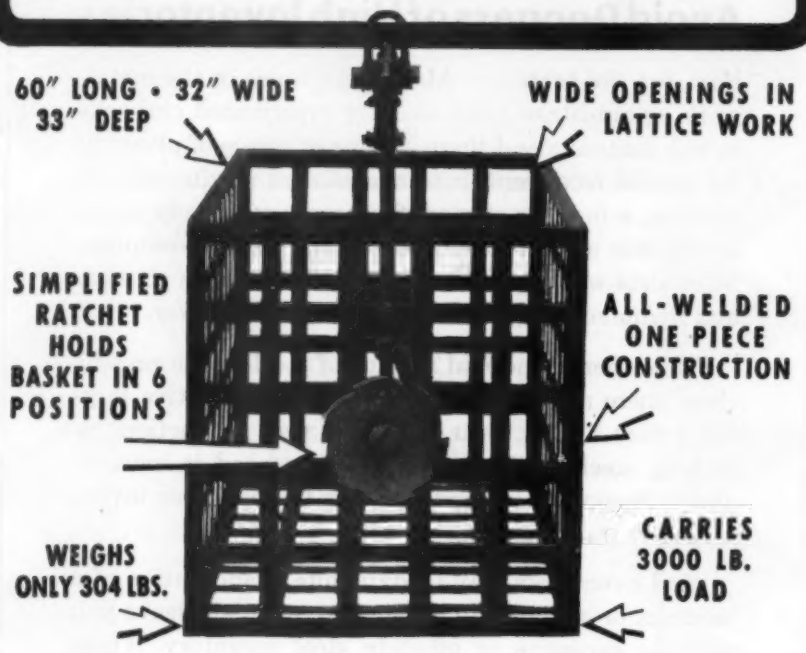
PARTIAL LIST OF STEELS IN STOCK

Bars	Sheets	Shapes	Carbon Steels	Tool Steel
Plates	Structurals	Tubing	Alloy Steels	Allegheny Stainless

RYERSON

Joseph T. Ryerson & Son, Inc., Steel Service Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Pittsburgh, Philadelphia, Jersey City

WELDCO special features in pickling baskets SPEED PRODUCTION


60" LONG • 32" WIDE
33" DEEP
WIDE OPENINGS IN LATTICE WORK
SIMPLIFIED RATCHET HOLDS BASKET IN 6 POSITIONS
ALL-WELDED ONE PIECE CONSTRUCTION
WEIGHS ONLY 304 LBS.
CARRIES 3000 LB. LOAD

Weldco pickling baskets are tailor-made to meet your requirements. Built of Monel, Inconel, or alloy steels, they carry greater pay-loads and give long, trouble-free service.

For example, the Weldco basket pictured above is one of ten being used by a large enameling company. Made of Monel, all welded into virtually one piece, and properly designed, they will carry 3000 pound loads of pots and pans during pickling operations. Large openings in the lattice work permit pickling acids to enter and leave the basket quickly. The simplified ratchet enables the basket to be firmly locked in six different positions. Do as this manufacturer did; let Youngstown Welding's large and experienced engineering department aid you to get more volume and lower cost production from your *pickling baskets, frit baskets, or burning racks.*

Mail the Coupon NOW!

THE YOUNGSTOWN WELDING & ENGINEERING CO.
3714 Oakwood Ave. Youngstown, Ohio

Please Send Your Catalog **BY RETURN MAIL**

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Company_____
Address_____
City and State_____

Processing Industries" announced by the United States Steel Corp., 436 Seventh Ave., Pittsburgh 30, Pa.

STEEL TUBING How tool steel tubing can save time, money, manpower and metal is the theme of a folder offered by the Bissett Steel Co., 945 East 67 Street, Cleveland 8, Ohio.

SURFACE PLATES Machine Products Corp., 6771 East McNichols Road, Detroit 12, Mich., has released a bulletin giving full information regarding types, sizes, weights and prices, on its line of surface plates, angles, parallels, vee blocks and other inspection equipment as well as handwheels and operating levers.

TEMPERATURE CONTROL The operation and types available of the synchronous, motor-driven cam program timer for accurately controlling sequence and duration of a series of three or more individually timed machine or process operations are covered in Catalog B7 offered by the Automatic Temperature Control Co., Inc., 34 East Logan St., Philadelphia 44, Pa.

THERMOCOUPLE Bulletin S2-4, containing 36 pages of illustrated data, gives a description of products, prices and recommendations for thermocouple users, and suggests substitutes for restricted materials. Also includes selection data, temperature conversion tables, decimal equivalents and wire resistances. May be secured from Wheelco Instruments Co., Harrison & Peoria Sts., Chicago 7, Ill.

NEW BOOKS

FUNDAMENTALS FOR THE AIRCRAFT MECHANIC—*By J. M. Markley, supervisor of mechanics' training, Eastern Airlines, Inc. 345 pages. Published by Whittlesey House, McGraw-Hill Book Co., 330 West 42 Street, New York 18, N. Y. $4.*

A number of excellent books on airplane mechanics are available. However, most of these books assume that the reader knows everything about an airplane and how it flies, is familiar with the essential materials of which planes and engines are built, and has a fundamental background in mechanical skills of blueprint reading and shop mechanics. These, precisely, are the facts which this book provides.

By unit or system breakdown, including the basic operating principles, the author has presented the overall picture of aircraft design, construction, flight characteristics. The first three chapters cover blueprint reading, shop mechanics, and the theory of flight, while in the remaining chapters the airplane is broken down into small

units; it is here that information is included on aircraft construction and materials. Fundamental data are given on hydraulics as applied to aircraft accessories, electrical equipment for airplanes, and, finally, propeller operation and maintenance.

•

MANUAL OF AIRCRAFT RIVETING—*By Marvin G. Roch, Captain, U. S. Army Air Forces. 96 pages. Published by the McGraw-Hill Book Company, 330 West 42 Street, New York 18, N. Y. $1.25.*

This book is a source of information about many of the difficult problems that face mechanics in repairing modern military headcraft. Its principal objective is to improve both methods and procedures of riveting.

Types of rivets used in aircraft construction, including the length, size and shapes of heads are described, with dimensions and other pertinent data given in tabular form. Methods for heat-treating rivets and preventing corrosion are also included. Riveting practices are described with information on designs of hand rivet sets and mechanical riveting machines. Practices recommended for flush riveting, blind riveting, are described in separate chapters. Tabular data, including drawings, give types of fasteners for assembly of parts to be riveted and special tools used in driving and removing rivets.

Tightening Bolts

Proper tightening of bolts has long been a problem in putting together machine parts of various kinds. Too long a wrench or too hard a pull stretched the bolt beyond the elastic limit and frequently broke it. The coming of castellated nuts introduced the problem of tightening enough to bring the slots and cross holes together, without having it too loose or too tight. Some advocate a "jam" fit between bolt and nut as the best way of preventing nuts from jarring loose.

One result of the attempts to secure proper tightening of bolts is the comparatively new torque wrench. This indicates, by dial or by sound, the number of pounds pulled in tightening the nut. But it is claimed that, even where the indicator on the wrench is accurate, the actual stress on the bolt depends on the way in which the wrench is used. A hard, rapid pull is claimed to put greater stress on the bolt than a slow, steady pull which gives the same indication. For this reason some of the well known airplane engine builders believe that the only real measurement of nut assembly is the stretch of the bolt. These builders prescribe the amount of stretch which must take place in tightening the bolts in connecting rods and other essential parts. This is measured by micrometer and has proved very satisfactory.

..... Elimination of fetch-and-carry methods increases output, lowers costs, and speeds delivery

ARE you satisfied with your present material handling methods? How long has it been since you have checked the flow of materials to spot bottlenecks that reduce output?

Every unnecessary minute spent *handling* material adds to costs and delays delivery. In plant after plant, essential products are being turned out with record-breaking speed, because Standard Conveyors have been engineered and installed to do the handling part of the job.

Why not call on Standard for a checkup of your conveyor system? It will cost you nothing and will not obligate you in any way.

Time-saving and cost-cutting equipment installed for today's wartime job is an investment in postwar profits.

Write for helpful reference book—"Conveyors by Standard"—Catalog No. AM-44.

STANDARD CONVEYOR COMPANY
General Offices:
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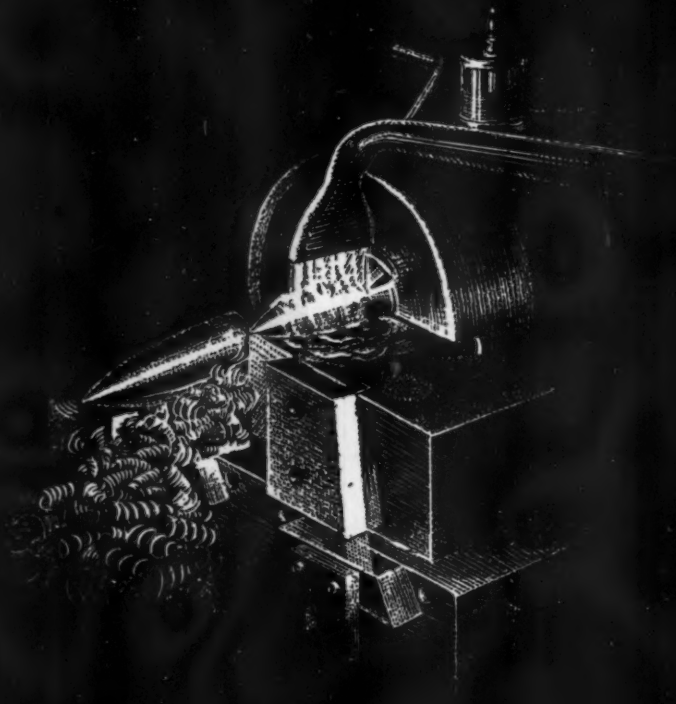
STANDARD
Quality and Power
CONVEYORS

★ ENGINEERED FOR FASTER PRODUCTION ★

EXAMPLE OF *Service*:



A manufacturer now turning out shell casings asked one of our Cities Service Lubrication Engineers to make a survey of his machining operations . . . Our engineer recommended certain changes, including the use of a new *transparent* blend of Cities Service Cutting Oil, which permits full visibility during the cutting operation. RESULTS: Tool life increased by 20% . . . cutting oil cost cut 25% . . . production efficiency and quality of work both improved.

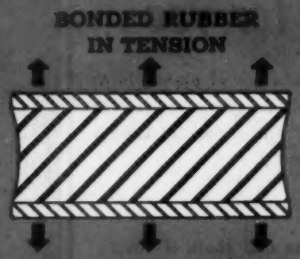
More and more, it's service that counts . . .

and *Cities Service* means good service!

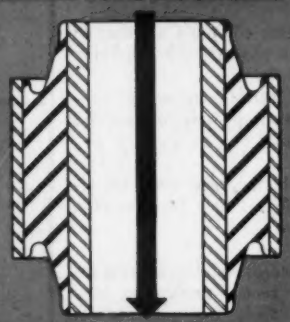
CITIES SERVICE OILS
ONCE-ALWAYS
CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY

IT TAKES RUBBER *In Shear* TO ABSORB VIBRATION

BONDED RUBBER IN COMPRESSION



BONDED RUBBER IN TENSION



LORD BONDED RUBBER SHEAR TYPE MOUNTING

THE harmful effects of vibration are fully recognized by both designers and users of equipment in every field of industry. Aircraft, communications, automotive, and instrument manufacturers, have long included vibration control and/or isolation as an integral part of their designs. Today many manufacturers of machine tools and other metal working machinery are incorporating vibration isolation in their new designs. Proper vibration isolation insures finer precision, longer functional life, less maintenance, and greater personnel efficiency.

"It Takes Rubber in Shear to Absorb Vibration."

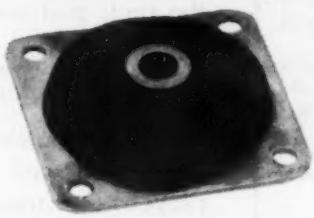
To obtain the greatest efficiency in vibration control, a mounting must be soft in the direction of the disturbing forces, yet have stability or resistance to movement in directions normal to the major thrusts. In designing rubber mountings the possibilities of using rubber (natural or synthetic) in compression, tension or shear present themselves. Illustrations above depict each method.

Rubber is an incompressible material, and to secure proper deflection, a compression type mounting must allow freedom for flow or bulge of rubber (Figure 1). To obtain the necessary deflection in compression, the mounting becomes excessively soft in all other directions, and instability results.

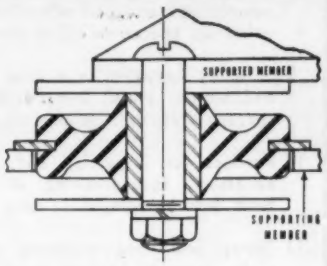
Rubber in direct tension, although softer than rubber in compression, lacks stability in directions perpendicular to the load (Figure 2). Rubber in tension stretches, thus reducing the cross-sectional area. It is therefore sensitive to injury, and any cut or tear will cause rapid failure.

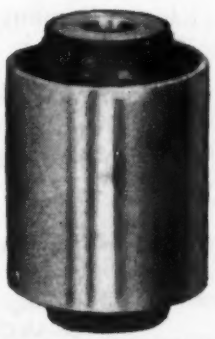
Rubber in shear is much softer, and yields more rapidly than in tension or compression. Greater deflections, therefore, can be obtained from a given size of rubber element, with the stress applied in shear. The results of utilizing this fact in a mounting design (Figure 3) are compactness, convenience of application and highly efficient isolation properties.

For complete information covering all Lord Mountings, as well as engineering discussion on vibration control, write for Bulletins 103 and 104.

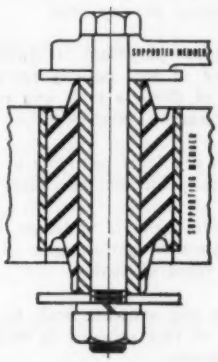


LORD PLATE FORM MOUNTING





LORD TUBE FORM MOUNTING



BUY MORE WAR BONDS

LORD
BONDED RUBBER
Shear Type
MOUNTINGS

IT TAKES RUBBER *In Shear* TO ABSORB VIBRATION

LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA

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DETROIT - - 7310 WOODWARD AVE.
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CANADIAN REPRESENTATIVES
RAILWAY & POWER ENGINEERING CORP., LTD.
TORONTO, CANADA

Originators of Shear Type Bonded Rubber Mountings

What McCASKEY Control will do for you . .

Experiences in hundreds of plants, large and small, employing from a few to many thousands, prove that McCaskey Tool Crib Control . . .

1 Reduces crib inventories

2 Eliminates loss and theft of tools

3 Reduces breakage to an absolute minimum

4 Quickly locates all tools whether in the crib or in possession of workmen

5 Speeds crib service, reducing non-productive waiting time of workers and machines

6 Reduces tool clearance time of departing employees to a fraction of a minute

7 Definitely records employees' responsibility for tools, preventing disputes when tools are returned or workers quit

8 Is operated with minimum crib personnel; inexperienced attendants of either sex trained in about one shift

9 Is easily installed in busiest cribs and plants; initial investment and operating expense quickly repaid

10 Provides for inspection and, when necessary, reconditioning of used tools before replaced in bins

11 Shows how long workmen retain tools; prevents keeping more than necessary at any time

12 Provides perpetual inventory and record of tool activity for elimination of obsolete tools and reduction of excessive inventories

13 Gives you facts justifying or denying necessity for tool purchases

14 Provides reliable data on life and comparative performance of brands and types of tools

15 Gives you accurate basis for allocation of tool expense to various departments

How TOOL CRIB CONTROL will actually pay for itself . . . in a day or two

A well known plant recently dropped several hundred employees in a few days. One department with McCaskey Control in its tool cribs checked-out its employees with practically no loss of tools.

Another that was operating with the conventional check system lost several hundred tools. The management knew it, but could do nothing about it. McCaskey Control would have cost less than the tools that were lost.

There are many other reasons why McCaskey pays its way. This is particularly important today.

Sooner or later during the reconversion period hundreds of plants must call in their tools and check out many of their employees . . . some temporarily, some permanently.

There will be no question about responsibility for tools in McCaskey controlled cribs and the tools will be returned. The losses in many others will greatly exceed the price of McCaskey installations.

Adopt McCaskey Control now. Improve your tool service, save tools and productive time now, and simplify reconversion to peace-time requirements later on.

●

Let us have a representative explain how McCaskey Tool Control can be installed in the busiest cribs without disturbing production in the least—or send you factual reports on McCaskey savings in several well known plants.

●

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Ontario, Canada — *The McCaskey Register Co., Watford, England*

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

DO YOU HAVE THESE BOOKLETS?

Send for any or all of these booklets for we want you to know the complete Erie Foundry line.

BOOKLET 333 • Erie Steam Drop Hammers up to 75,000 pounds.

BOOKLET 328 • Erie Board Drop Hammers up to 10,000 pounds.

BOOKLET 332 • Erie Trimming Presses in all types.

BOOKLET 330 • Erie Double Frame Steam Hammer up to 24,000 pounds.

BOOKLET 335 • Erie Single Frame Forging Hammers in many types up to 6000 pounds.

BOOKLET 334 • Erie Hydraulic Presses for synthetic rubber and plastic products.

Request on company letterhead, please

ERIE FOUNDRY COMPANY • *Erie, Pa., U.S.A.*

DETROIT	CHICAGO	INDIANAPOLIS
335 Curtis Building	549 Washington Boulevard	335 Postal Station Building

ARMY E NAVY

ERIE

ERIE BUILDS *Dependable* HAMMERS

From these splendidly equipped research and testing laboratories and the level-headed dreamers that staff them, have come new and better steels, and improved methods for their application. Among many, these are especially notable:—

Isothermal Transformation diagrams which permit the steel user to readily determine *in advance*, the heat treatment required for various grades of steels to obtain specific results.

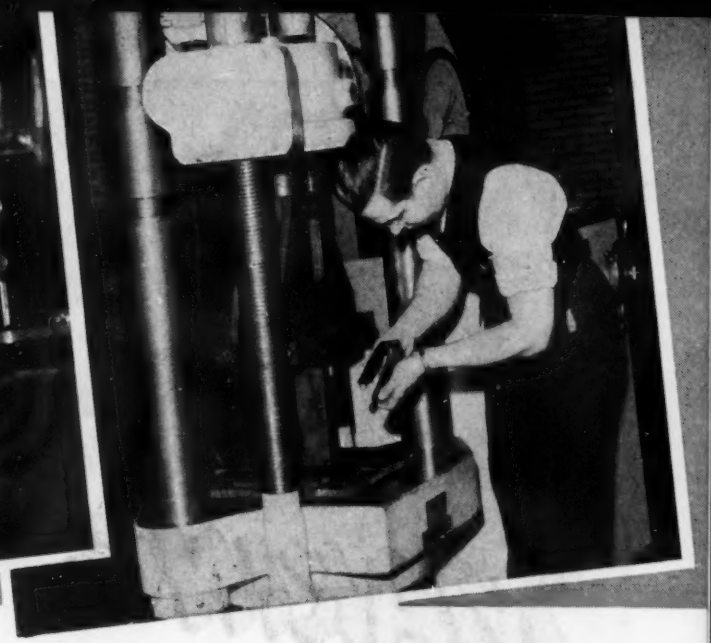
High-Strength steels—combining atmospheric corrosion resistance and high strength which have made possible the safe reduction of deadweight at low cost.

Austempering—and other new and special heat treating processes—which provide greater uniformity in heat treatment and insure improved physical properties in the heat treated condition.

Hardenability studies which by means of factors based on the composition of the steel, permit the determination of the hardening characteristics of steels and their suitability for given applications.

N. E. Steels—Much of the major contribution Carnegie-Illinois was able to make in the development of these National Emergency Steels was based on the valuable research previously done in our laboratories—notably in the field of hardenability.

USS



To cure "steel" headaches before they start

...these men work for you for nothing!

THEIR job is to put steel through its paces. To get rid of bugs that might interfere with your production. To test, and *to find ways to improve* steel's forming, forging and machining qualities—its response to heat treatment — its weldability.

In 174 U. S. Steel laboratories, more than 1200 steel metallurgists, engineers and research workers pre-view steel and make sure—before you use it—that the steel will meet your fabrication requirements as it should, and that it will perform satisfactorily in service.

Right now, when it is vitally necessary that man-power and machinery be used to full capacity, the work of these steel specialists in developing facts that forecast performance is of prime importance in keeping your production lines running smoothly.

It is a plus service that we are proud to be able to offer to every user of Carnegie-Illinois steels. And it is free.

So, too, is the assistance of our metallurgists, and the extensive laboratory facilities at their disposal, in helping you get the most out of the steel now going through your shops. If you want practical help in speeding-up forging and welding operations, in reducing machining schedules, in saving time in heat treating and other fabricating problems, do not hesitate to call on us.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

Again Morse Experience Comes To The Front

L.V.T. (2) Water Buffaloes constructed by the Food Machinery Corporation have what it takes to forge steadily ahead towards their objective.

Morse, with close to half a century's experience in the building of special and standard silent and roller chain, was called upon to build the special track chains which carry these Water Buffaloes over land and water.

Morse design engineers welcome the tough jobs. Their services are available to those desiring specially developed chains or chain assemblies for conveying, handling or other purposes.

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE Roller and Silent CHAINS

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

BLONDE? MAYBE→→SMART? COULD BE!

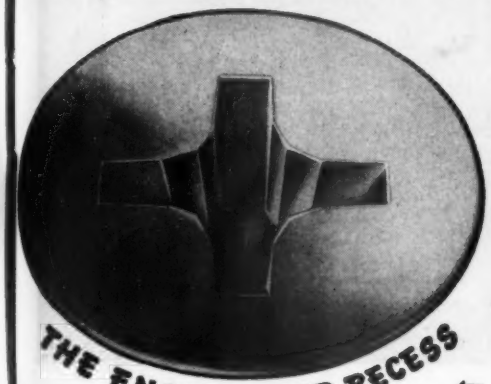
MUSCLE? NOT MUCH→→→→→→BUT, BROTHER, SHE'LL DO A WHALE OF A JOB ON YOUR ASSEMBLY LINE

IF YOU USE THE RECESSED

HEAD SCREW THAT MAKES SCREW DRIVING TROUBLE-PROOF

→→THAT ENDS THE NEED FOR SKILL AND

BRAWN



←←←←←←←IT'S PHILLIPS

Anyone can drive Phillips Screws!

Time was when it took real "he-men" to drive screws. They had to be strong . . . had to have skilled hands . . . had to be trained. But today the job's a cinch for anyone!

What makes it a cinch is the Phillips Recessed Head Screw – the screw which, time studies prove, steps up screw driving speed as much as 50 per cent.

With Phillips Recessed Head Screws, there's no premium on brawn! They drive easy – because turning power is fully utilized. Nor is there any premium on training or skill. Dangerous driver skids are out, and workers just can't fumble, make wobbly starts, or drive slantwise.

As a result, untrained girls quickly match anything experienced male operators do – driving Phillips Screws.

Think what this means to you in (1) man-and-training hours saved, in (2) increased production, in (3) finer workmanship. Then ask yourself if you're getting the same advantages from slotted head screws . . . or from any other type you're using.

PHILLIPS Recessed Head SCREWS

WOOD SCREWS · MACHINE SCREWS · SELF-TAPPING SCREWS · STOVE BOLTS

TO MAKE WARTIME QUOTAS AND PEACETIME PROFITS

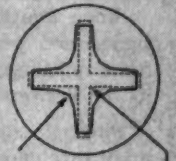
Faster Starting: Driver point automatically centers in the Phillips Recess . . . fits snugly. Fumbling, wobbly starts, slant driving are eliminated. Work is made trouble-proof for green hands.

Faster Driving: Spiral and power driving are made practical. Driver won't slip from recess to spoil material or injure worker. (Average time saving is 50%.)

Easier Driving: Turning power is fully utilized. Workers maintain speed without tiring.

Better Fastening: Screws are set-up uniformly tight, without burring or breaking of screw heads. The job is stronger, and the ornamental recess adds to appearance.

IDENTIFY IT!



Center corners of Phillips Recess are rounded . . . NOT square.

Bottom of Phillips Recess is nearly flat . . . NOT tapered to a sharp point.

23 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.

NICKEL AIDS THE ELECTRICAL EQUIPMENT INDUSTRY

to KEEP 'EM OPERATING!

ELECTRICAL ENGINEERS continue their spectacular progress.

Since Pearl Harbor they have designed and perfected equipment that frees military strategy from many of its old limitations.

Through tireless motors big and small, through tiny electronic tubes and gigantic motor generators, through a myriad of instruments and machines these men have put electrical energy to work for Victory.

Constantly striving to improve its products, the electrical industry has acquired long experience with metals and alloys of many kinds.

This experience has demonstrated that when properly used, nothing quite takes the place of Nickel. From resistor grids to armature shafts, from limit switches to reduction gears, Nickel and its alloys have been assuring the dependability so important in equipment that must not fail . . . even under wartime overloads.

Nickel imparts toughness, strength, and fatigue resistance to other metals . . . makes them stand up better under abrasion, wear, shock, and stress.

As in other industrial fields, a little Nickel goes a long way to keep electrical equipment operating.

For years we have enjoyed the privilege of cooperating with technical men of the electrical equipment industry . . . and of many others. Whatever *your* industry may be . . . if you want help in the selection, fabrication, and heat treatment of alloys . . . we offer you counsel and data.

New Catalog Index

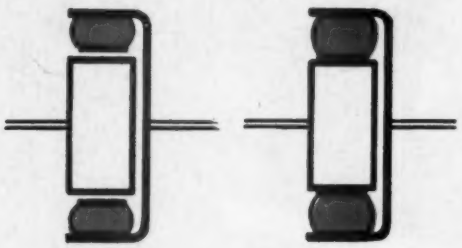
New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects — from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

* *Nickel* *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

The Only Heavy Duty Clutch with these 12 Advantages

No levers, no arms, no toggles, no springs! Nothing to adjust, nothing to lubricate! Low maintenance cost—long wear! Clutch action as light, or as firm, as you want it. Performance proved in the toughest kind of naval service, and on hundreds of heavy machinery applications.

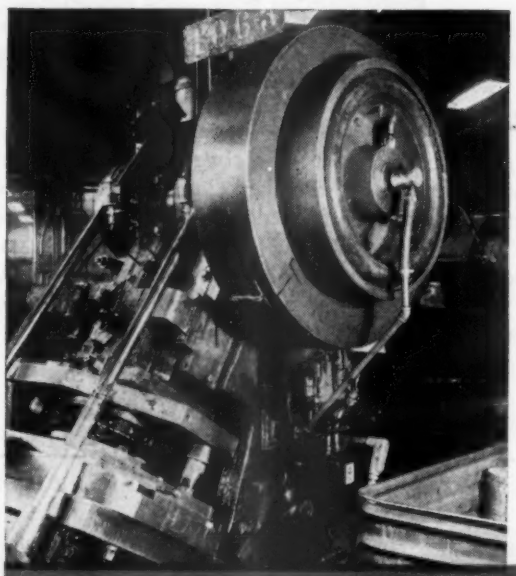


It works like this

Rubber and fabric air gland, on drive member, rolls free of the driven member. Compact, and free from mechanical complications.

Inflate gland—clutch engaged. Deflate gland—clutch disengaged. Torque entirely controlled by air pressure—vibration and shock absorbed.

1. Simple in design and operation
2. Flexible control by air
3. No adjustments or oiling—low maintenance
4. Dampens vibration—absorbs shocks
5. Corrects misalignment automatically
6. Smooth starting—no jerks
7. Runs cooler—uniform pressure
8. Controls torque by air pressure
9. Greater capacity—more compact
10. Remote control by air valve
11. Replaces flexible couplings
12. Acts as clutch, slip-clutch, brake and coupling.



For Heavy Duty Machinery

Fawick Engineering Department will gladly give you detailed information on special applications, to meet your operating conditions.

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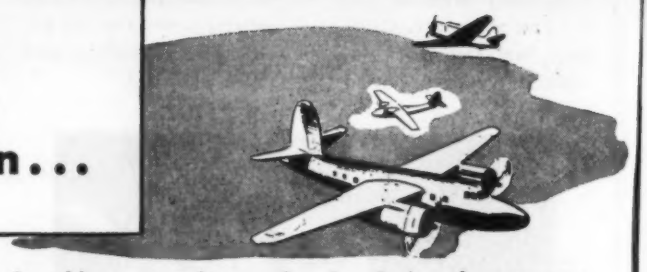
9919 Clinton Rd. Cleveland 11, Ohio

In Canada, Renold-Coventry Ltd., Montreal, Toronto, Vancouver
In Britain, Crofts Engineers, Ltd., Bradford, England

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

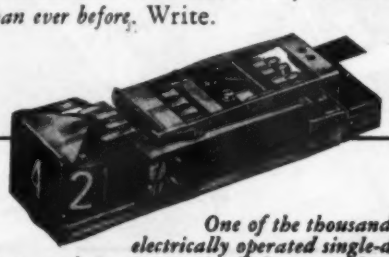
So Traffic May Move Smoothly and Safely in the air over Washington . . .



When the air is thick with metal wings on the airways to and from the nation's capital, it's a touchy business keeping pilots out of each other's way . . . bringing them in, clearing them out. So the Civil Aeronautics Administration is turning from the hand-posting of flight data and hand-copying of reports to automatic flight-control and progress boards.

These boards, linked by telegraph networks to key points along the 1500 miles of airways in each traffic-control area, will post the data for all flights in the area . . . using numerical codes to show the controller such items as flight identification, direction, estimated and actual time, proposed and actual altitude, clearance instructions. With the help of these up-to-the-minute *facts in figures*, more planes can be controlled with greater safety, speed, and efficiency. In the Washington Airway Traffic Control Center, the world's first electrical flight progress board, developed by Teleregister on the principle of the automatic stock quotation system, points the way for this modernization. In it, making up the columns of single-digit indicators showing the flight data, are thousands of counters built by Veeder-Root.

So add a postscript to the time-honored statement that "Veeder-Root Devices Count Everything on Earth." Now they will also count every plane *over* the earth. And write it down, too, that if your product or plant counts in the war effort, chances are that Veeder-Root can find a way *to make it count for more than ever before*. Write.

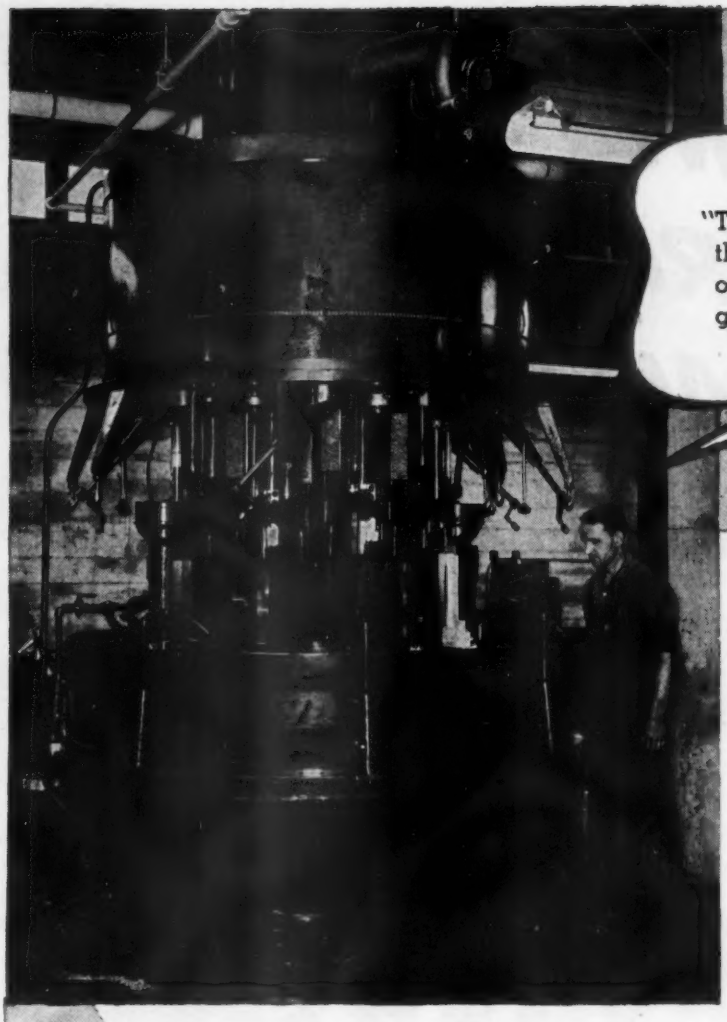


One of the thousands of electrically operated single-digit indicators used in automatic flight-control boards. Each white dot on the wall panel above represents one of these counters.

VEEDER-ROOT INC.

Hartford 2, Connecticut

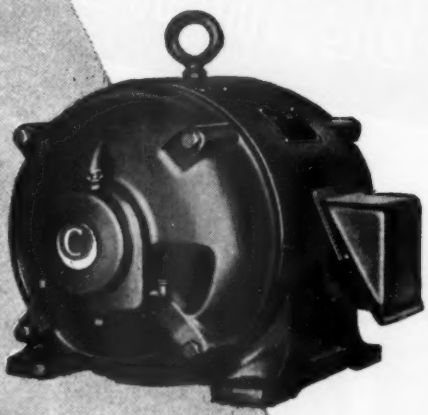
In Canada: Veeder-Root of Canada, Ltd., Montreal
In England: Veeder-Root Ltd. (new address on request)



"Thanks to the help of that Century motor, this machine turns out a first-class job on every part. Smooth running means greater accuracy — less rejects."

CENTURY MOTORS'

Unusual Freedom From Vibration Contributes Greatly to Precision Work



Century motors are built in a wide variety of types from 1/6 to 600 horsepower.

On applications such as that shown in the photograph above, accuracy of output is paramount. One of the reasons that Century squirrel cage motors are so often selected for this type of job is that their unusual freedom from vibration contributes to the accuracy of the driven machine.

This highly valuable feature in Century motors is maintained by careful balance and rugged construction—which includes rigidly constructed frames, unique end bumpers, running balance, accurately machined feet, large rigid motor shaft, accurately aligned bearings, and other features.

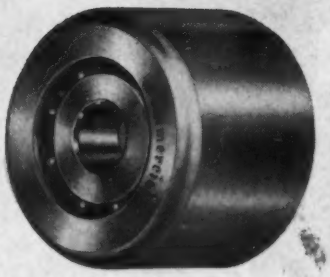
Whether it's for a present-day production problem or a postwar application, a Century engineer will be glad to work with your staff. His experience in applying the wide range of Century motors may prove valuable to you. Call him in.

Century MOTORS

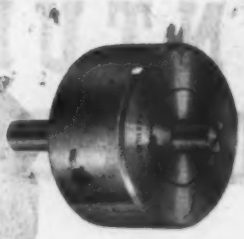
CENTURY ELECTRIC COMPANY, 1806 Pine Street • St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

EFFICIENT BALL BEARING PERFORMANCE



FOR THE DURATION, WE ARE UNABLE TO SUPPLY MANY TYPES OF BEARINGS FORMERLY MANUFACTURED



"Commercial" ANNULAR BALL BEARINGS

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POUGHKEEPSIE, N. Y.

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what the clipper's secret means to you-

The Clipper's secret was proper control of air. Schrader equipment and controls give compressed air *power* versatility in industry that urges you to look at air *power* in a new light.

New economy, for example. Schrader Air Ejection Sets apply the principle of controlled, intermittent blasts instead of wasteful constant flow. This saves you air and money.

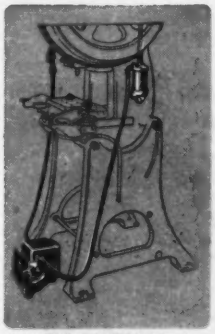
New utility. Even the most skeptical production men are amazed at the number and scope of jobs performed with air *power*. Drilling, boring, tapping, pressing, feeding, ejecting, and countless other operations are made easier with less fatigue, using Schrader compressed air equipment.

Look into the advantages of the Schrader complete line for new economy, new utility, new safety features and relief from operator fatigue.

Write for 48 page catalog No. 10. Schrader devices are available through your distributor. If a Schrader engineer is required for large installations or particularly complicated jobs he, too, is available by arrangement through your distributor.

Power Press and Kick Press Controls Complete, eliminate operator fatigue and incorporate safety features. Also Air System Accessories (check valves, rotating joints, speed control valves, air strainers, 4-way valves and cylinders), Hydraulic Gauges, Air Hose, Hose Ferrules and Tools.

MADE BY THE MAKERS OF SCHRADER TIRE VALVES AND GAUGES



TIP TOE CONTROLS—free hands for guiding or feeding work. Eliminates foot fatigue.

HOSE REELS—air handy where you want it—hose out-of-way when not needed.

QUICK-ACTING AIR COUPLERS—with "safety twist"

Schrader

CONTROLS THE AIR

ARMY E NAVY

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* **BROOKLYN, NEW YORK**

"AMERICAN PHILLIPS SCREWS Are Helping Us Meet Our War-Time Schedules ...and they'll lower the cost of our Peacetime Products"

American Phillips Screws are saving an average of 50% of war-production assembly time for two reasons:

1. *Faster Driving Methods.* The snug fit between the Phillips bit point and the tapered Phillips recess prevents the driver from slipping out of the recess, and permits change-over to electric and pneumatic driving, greatly decreasing the driving time over the slower hand-driving method.
2. *No Spoiled Work.* The non-slipping feature eliminates spoiled work and lost-time accidents. Every screw is driven up straight and tight.

These substantial savings in time and materials make American Phillips Screws *the fastest method of war production screwdriving under any conditions.* And when we return to peacetime production, these savings will lower the over-all cost of screw-driving assembly.

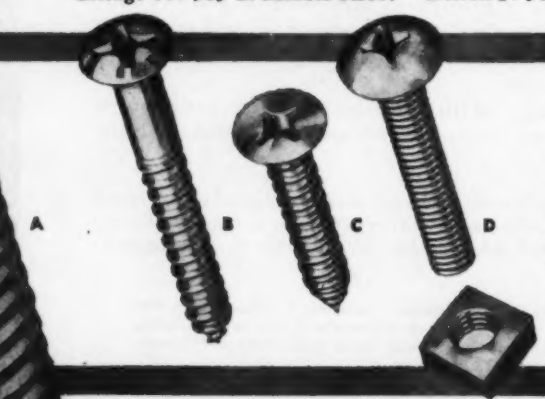
4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN SCREW COMPANY

PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street *Detroit 2:* 502 Stephenson Building

American Screw Company manufactures a complete line of Phillips Recessed Head Screws, in a full range of sizes, and with all styles of heads.



A. American Phillips Machine Screws.

B. American Phillips Wood Screws.

C. American Phillips Hardened Self-Tapping Sheet Metal Screws.

D. American Phillips Stove Bolts.

Put the Screws on the Axis... BUY WAR BONDS!

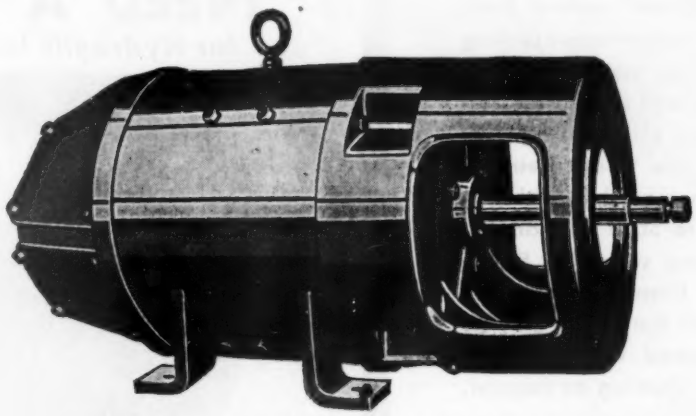
In the early days, this was the peak of streamlining.

STREAMLINING!

Streamlining adds more than beauty. For years, Reliance engineers have pioneered in streamlining electric motor-drives—*for utility and efficiency.*

Among recent developments are axial-flow fan motors, close-coupled pump motors, V★S Adjustable-speed Drive. These and other Reliance Motors are being used in many highly efficient installations where space is limited . . . where flexibility of power control and ease of operation are essential . . . where safety is a prime factor . . . and trim appearance desirable.

For further advantages of streamlined motor-drive and practical design suggestions, call in a Reliance man.



Reliance Splash-Proof D-c. Close-coupled Pump Motor. Pump is mounted right on the motor shaft—eliminates misalignment, saves space; fewer parts, less maintenance.

RELIANCE A·C D·C MOTORS

RELIANCE ELECTRIC & ENGINEERING CO.

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TOOL HOLDER

This new, patented diamond tool holder provides a fast, accurate method of meeting every requirement in dressing and truing operations. Equipped with internal coolant ducts for wet grinding, and external cooling fins for dry grinding, metal setting as well as stone are kept at safe operating temperatures, eliminating diamond breakage, due to overheating. Thus, tool life is increased, resulting in savings from 30 to 50% in diamond dressing and truing costs. For finish-dressing SMITITE Diamond Tools are available, in which the stones may be completely consumed without resetting. *Catalog on request.*

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THE JOHNSON FRICTION CLUTCH

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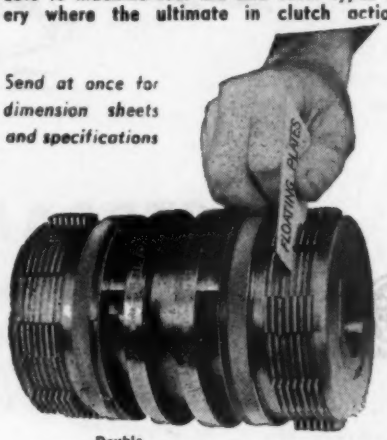
THE NEW "MAXITORQ" IS IDEAL FOR MACHINE TOOL APPLICATIONS

"MAXITORQ" FLOATING TYPE MULTI-DISC CLUTCHES are recommended for power transmission applications where smooth engagement, quietness, cool running without drag and quick, positive disengagement are required. They are especially adaptable to machine tool use and other types of industrial machinery where the ultimate in clutch action is of paramount importance.

Send at once for dimension sheets and specifications



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Features include floating discs which assure minimum drag, easy manual assembly and quick easy adjustment. They are compact, simple and require minimum attention. Made in capacities from ½ HP to 5 HP at 100 R.P.M. in single, double and cut-off coupling types.

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NEED A PUMP?
for Hydraulic Installations

If you need pump capacity between 5 and 37 G. P. M. or pressures up to 500 lbs. per sq. in. for hydraulic installations, Brown & Sharpe 500 Series Pumps are your answer. Herringbone gears, antifriction bearings, balanced operation, and other desirable features. Brown & Sharpe Mfg. Co., Providence, R. I.

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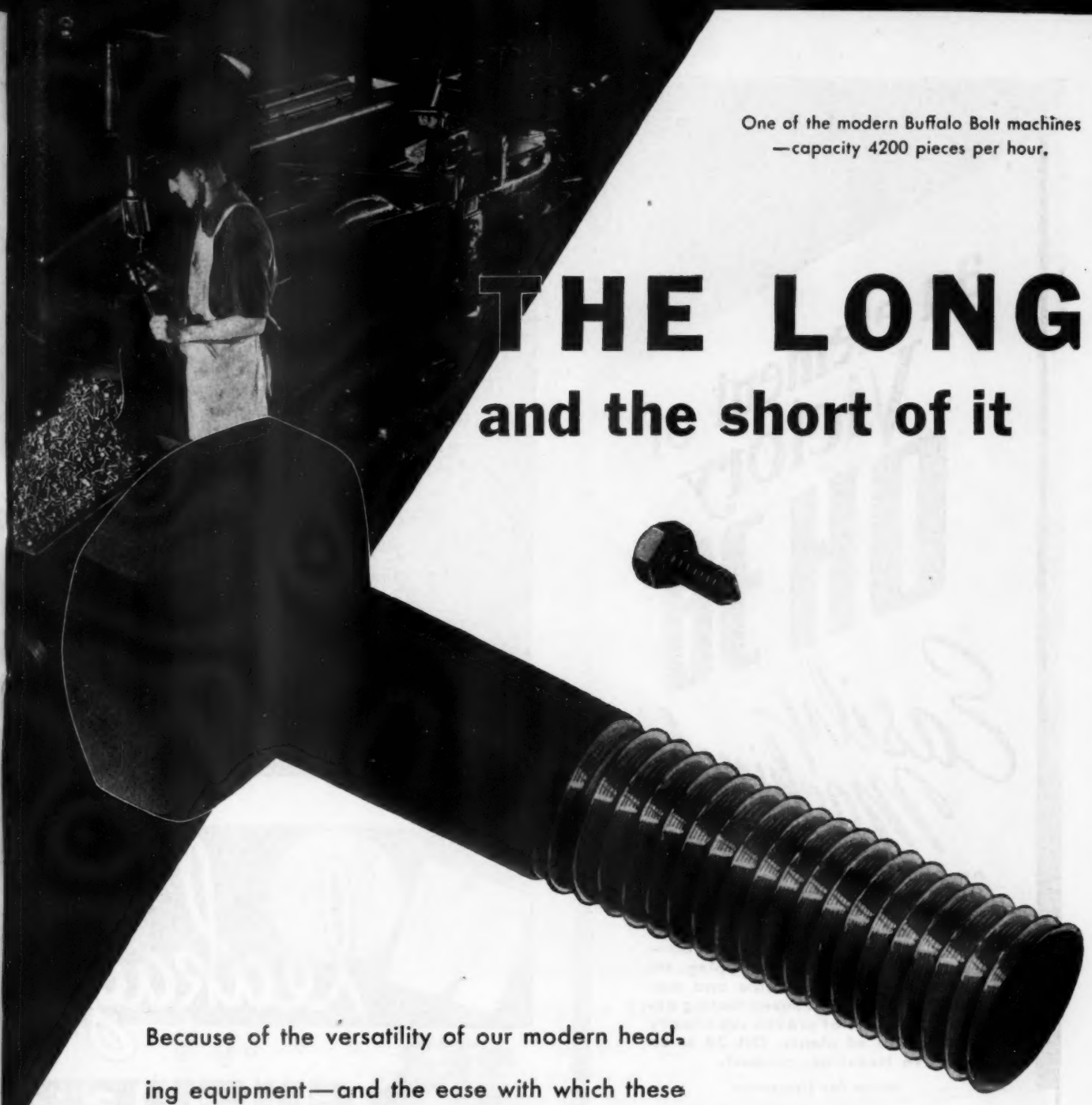
BROWN & SHARPE PUMPS



One of the modern Buffalo Bolt machines —capacity 4200 pieces per hour.

THE LONG and the short of it

Because of the versatility of our modern heading equipment—and the ease with which these machines can be changed over—Buffalo Bolt Company is supplying all types and sizes of circle "B" fasteners for every sinew of war—from the tiniest cap screw to the heaviest battleship bolt.

ARMY E NAVY

BUFFALO BOLT COMPANY

NORTH TONAWANDA, N. Y.

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an element of Victory

OH 38

Easily machinable

An Aluminum Alloy—Non-Heat Treated. The perfected metal that surpasses all others for a wide variety of machining operations. Non-corrosive—Easy on machine tools—Holds threads without stripping. Its light weight reduces table and machine loads and increases tooling accuracy. 5 years of proven superiority in hundreds of plants. OH 38 is an exclusive Hedstrom product.

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THE WATERBURY STEEL BALL CO. INC.
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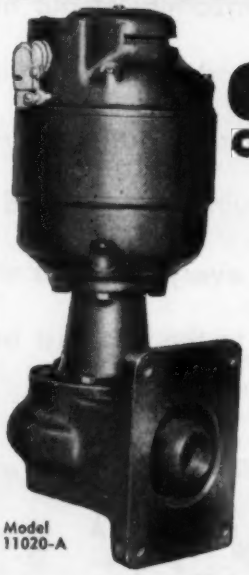
No leakage



Model 11020-A

GUSHER COOLANT PUMPS

Packing nut, foot and relief valves are eliminated—yet, there is no friction or binding, and no leakage. Large ball bearings and sturdy one-piece suspended shaft insure rigidity and longer life. Delivers coolant from a dribble to maximum capacity. There is a model and type for your needs. Write for complete new catalog.

Model 11020-A — Internal discharge type. Outside piping eliminated. From 1/10 to ¾ h.p.

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1809 READING ROAD CINCINNATI 2, OHIO
THE "GUSHER"—A MODERN PUMP FOR MODERN MACHINE TOOLS

FINAL INSPECTION—*a check-up on* SIER-BATH PRECISION

No gear leaves the SIER-BATH plant until it has passed the closest final inspection. Whether it's a big bull gear like the one shown here or a small one, it is OK'ed for shipment only when it has met the tolerance requirements called for in the specifications.

SIER-BATH is equipped to produce the gears you need promptly in all Sizes from 2" to 52". Your inquiries are invited.

SIER-BATH GEAR CO.

9254 HUDSON BOULEVARD — NORTH BERGEN, N. J.

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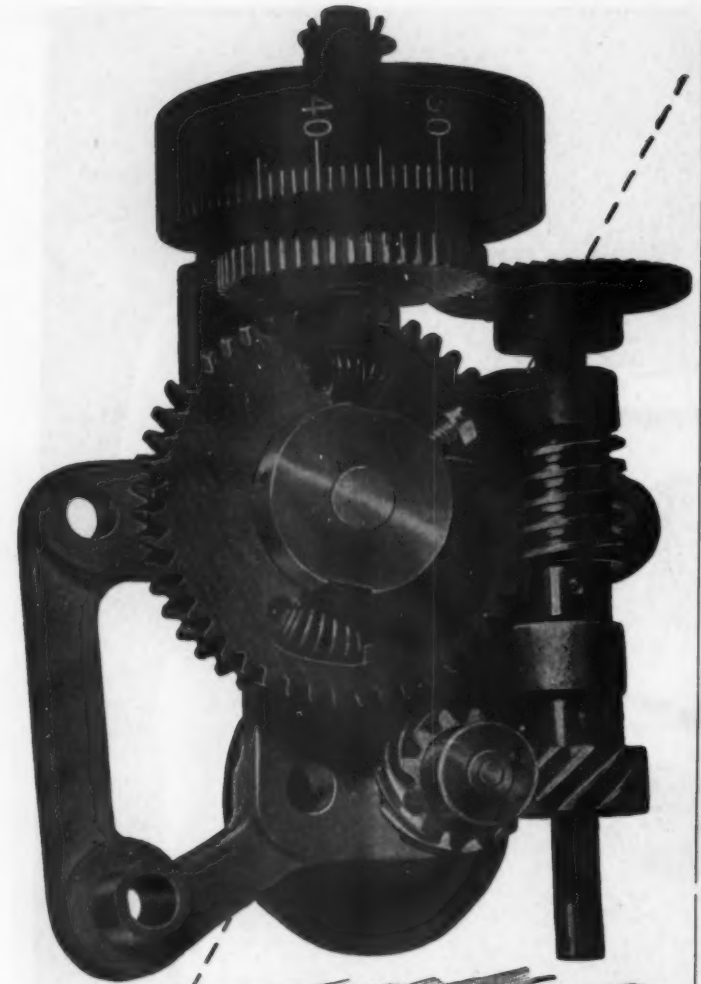
The Doorway to 38 years experience in making Precision Gears



FLIGHT No. 4 REPORTING

In base to plane communication one of the vital contributing factors toward the accuracy of pin point tuning is precision gears, and we are proud to say that QUAKER CITY GEARS are playing their part in assuring this accuracy.

Quaker City Gear Works
INCORPORATED

1910-32 NORTH FRONT STREET, PHILADELPHIA, PENNSYLVANIA

Gear Specialties

SPURS • HELICALS • BEVELS
(Straight & Spiral)
WORM GEARING • THREAD GRINDING
(14 to 96 D. P.)

This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.

With full *production capacity* scheduled far into the future, all new inquiries are now necessarily subordinated to these vitally important prior commitments. However, every *urgent* need will be given careful consideration.

Gear Specialties
MANUFACTURERS
CHICAGO

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PERFORMANCE IS THE *first* ESSENTIAL...
with CINCINNATI GEARS

- ★ SPUR
- ★ BEVEL
- ★ HELICAL
- ★ SPLINE
- ★ WORM
- ★ SPECIAL

Maximum performance and dependability are two qualities that are absolutely essential in gears for industry and our armed forces.

The traditional dependability of Cincinnati Gears under the toughest of operating conditions is being emphasized as never before.

You, too, can depend on Cincinnati *Gears, Good Gears Only*, for better performance in your equipment.

THE CINCINNATI GEAR COMPANY
"Gears... Good Gears Only"
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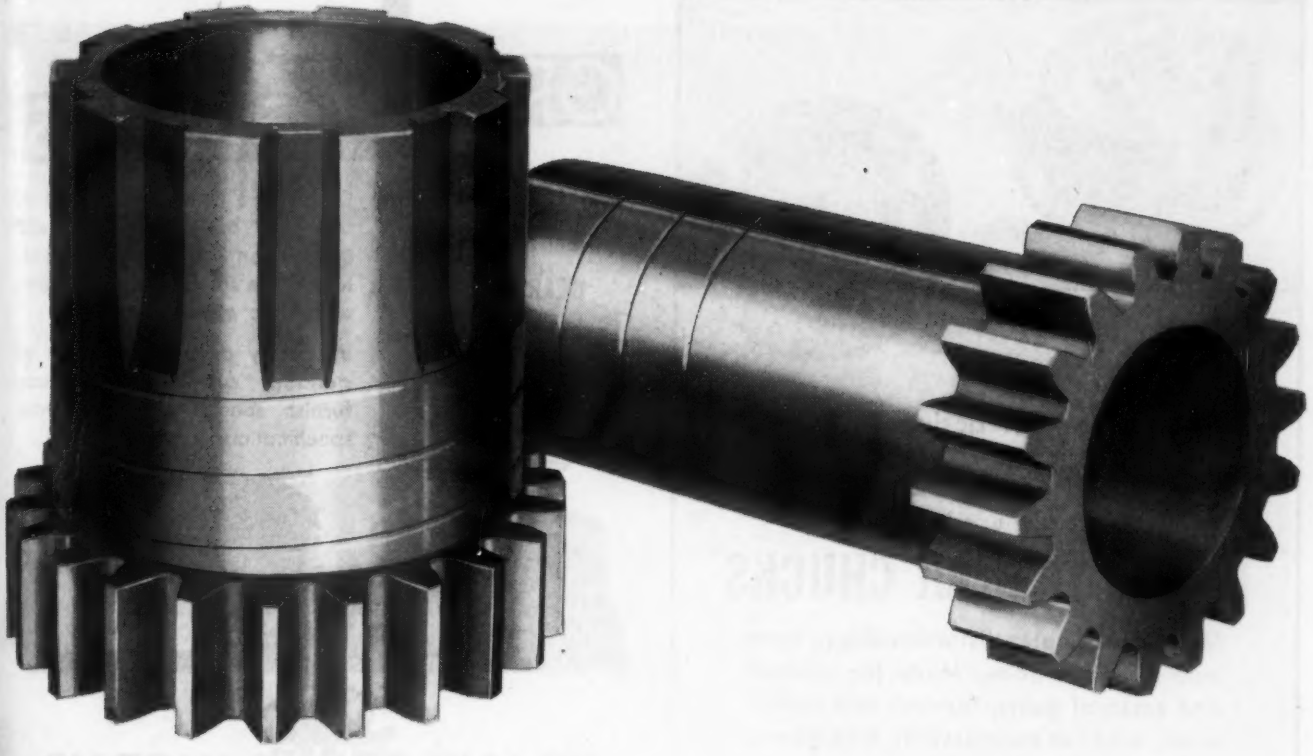

Gears *to your specifications*

Spur Gears
Helical Gears
Splined Shafts
Worms
Worm Gears
Bevel Gears
Miter Gears
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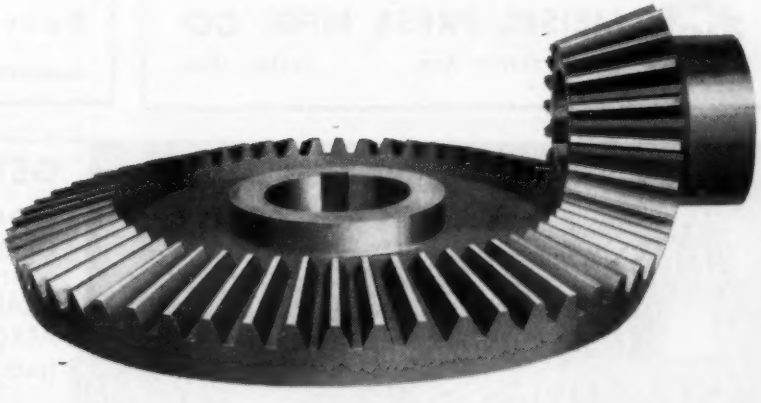
Ratchets
Racks
Lead and Feed Screws

Adams Gears are produced with the finest production and inspection equipment obtainable and they can be furnished to your most exacting requirements.



THE ADAMS COMPANY

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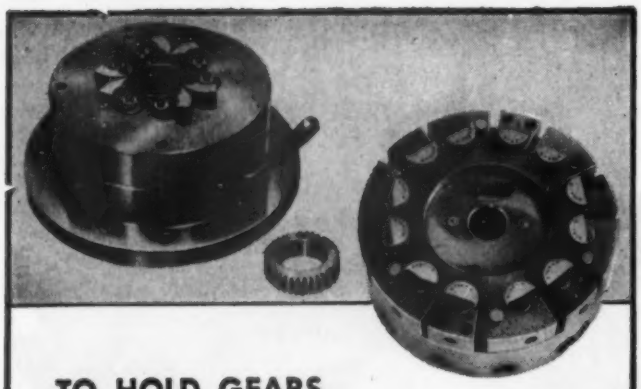
1883 — Our 61st Year — 1944



TO HOLD GEARS
with precision for boring or grinding
HAVE TEETH GRIPPED ON LINE OF ACTION
Principle used only in

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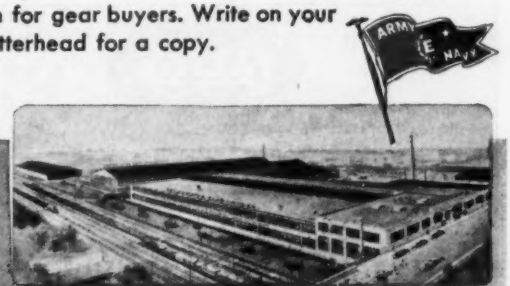

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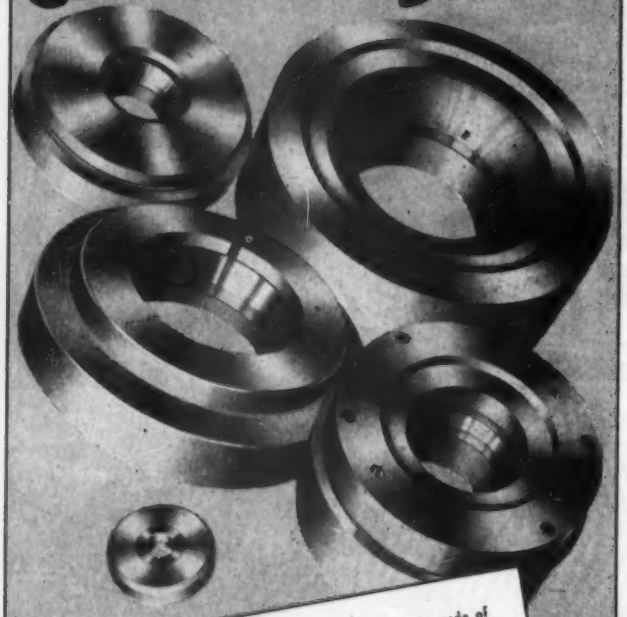

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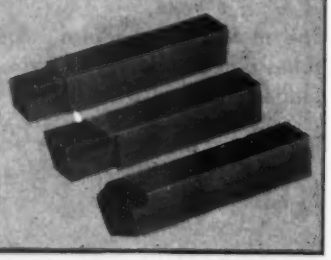

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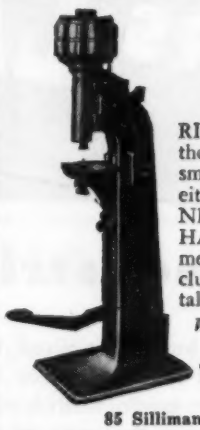

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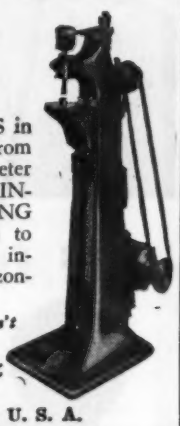

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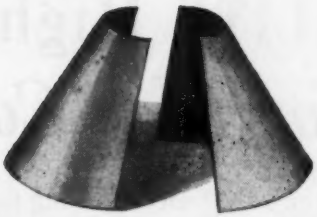
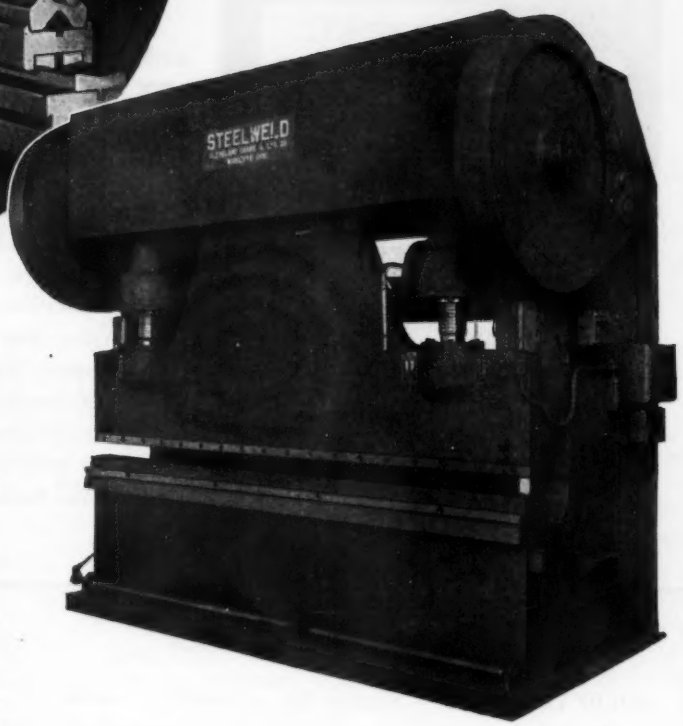


Conical Shapes quickly made with bending dies



Conical shapes are easily made on Cleveland Steelweld Presses with the same dies as are used for straight bending work. The ram-tapering mechanism, one of many exclusive Steelweld features, makes this possible.

For bending, forming and punching metal — single jobs or large production runs — Steelwelds are versatile money-making tools, easily operated by inexperienced workers. Often the same dies will perform many kinds of work. When necessary to change dies, it is usually a simple matter, quickly done.

The illustration above shows conical-shaped bottoms being formed of 3/16-inch plate for buckets 48 inches in diameter.

Steelwelds will work plate of all thicknesses to one inch and lengths to 20 feet.

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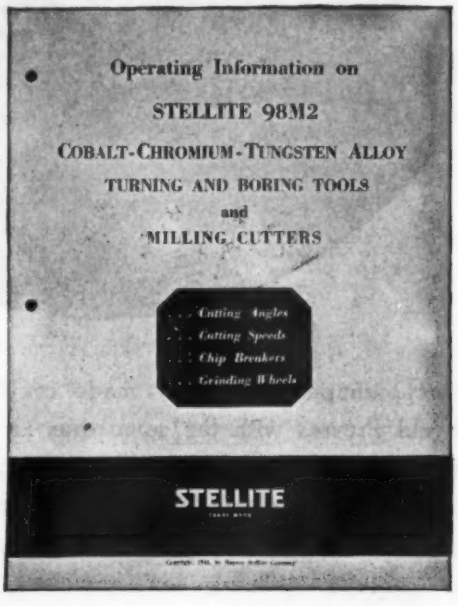
STELLITE 98M2 metal-cutting tools are made especially for faster machining of steel. These cobalt-chromium-tungsten alloy tools are also excellent for brass, bronze, cast iron, and most of the machinable materials. They are generally used for turning, facing, boring, grooving, and forming all these materials, and for milling mild steel, cast iron, brass, and bronze.

STELLITE 98M2 alloy has high red hardness, good edge strength, and unusual toughness. This combination of properties makes possible heavy cuts at high speeds with coarse feeds, which in turn means high production at low cost per piece machined.

Write for copies of the informative booklets about STELLITE 98M2 tools illustrated below.

The booklet (left) describes the type of STELLITE 98M2 tools that are available, including sizes and prices for each type.

Through drawings, photographs, and charts, the eight-page booklet (right) describes the cutting angles, lists recommended speeds and feeds, shows chip-breaker grinds, and gives information on wheels for grinding STELLITE 98M2 tools.



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Many types of special STELLITE tools are regularly supplied, cast and finish-ground to users' specifications. These include solid bits, welded-tip tools, milling cutter blades, reamer blades, brazed-in blade shell end mills, form tools, boring tools, counterbores, spotfacers, and reamers.

Complete information on special STELLITE tools can be obtained from any Haynes Stellite Company district sales office.

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Distance between bars adjustable

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Self-contained motor-driven pumping unit

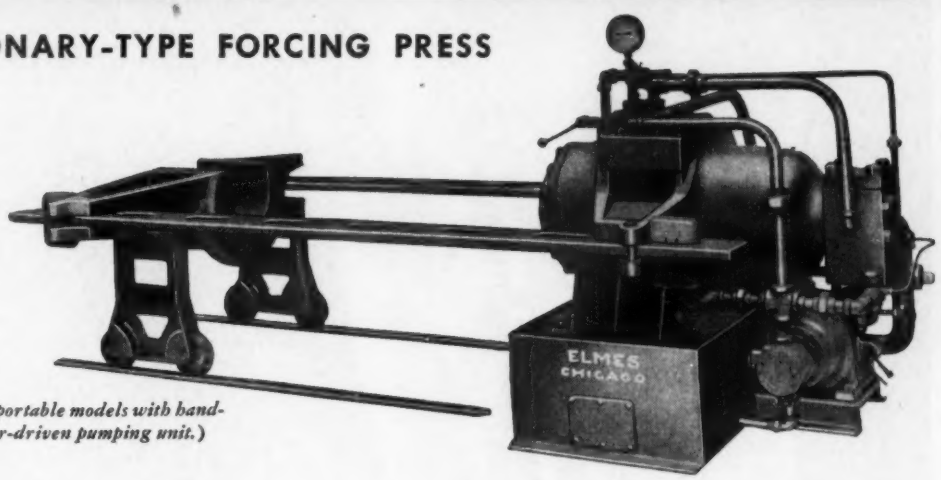
Long ram stroke

Controlled pressing speed

Power return of ram

Directional control lever

Complete accessories available



(Also furnished in portable models with hand-operated or motor-driven pumping unit.)

Many of America's leading production men rely on Elmes forcing presses to speed up maintenance and assembly work.

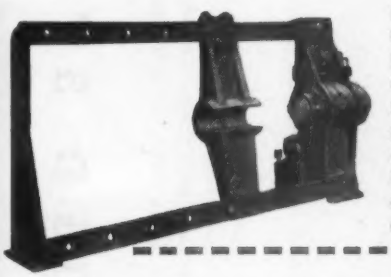
They find these presses ideal for such repair work as pressing gears on and off shafts, removing and inserting bushings, pushing shafts out of broken-down pulleys, and any number of other important jobs that pop up regularly in all shops.

Likewise in assembly operations, where forced fits are required, Elmes high-speed forcing presses have become a production tool of high efficiency. They are doing a great job, for example, forcing shafts in armatures of motors or pressing locomotive wheels on axles. For assembly operations of this character, Elmes has incorporated rapid traverse features, variable pressing speeds, pressure adjustments, and automatic controls; and, where necessary, has added special work-holding fixtures in their standard forcing-press designs.

Elmes standard patterns cover a wide range of sizes and capacities, from very large presses to portable models with hand-operated or motor-driven pumping units. For each press complete accessories, such as work-holding fixtures and filler blocks for resistance heads, are available.

Ask the Elmes Engineering Staff to assist you in the selection or design of forcing presses and other efficient hydraulic equipment—presses, pumps, accumulators, valves, accessories. Suggestions and recommendations, with cost estimates, will be furnished without obligation.

INCLINED-TYPE FORCING PRESS *(Wheel Press)*



Distance between ram and resistance head adjustable

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Directional control lever

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Power return of ram

Complete accessories available

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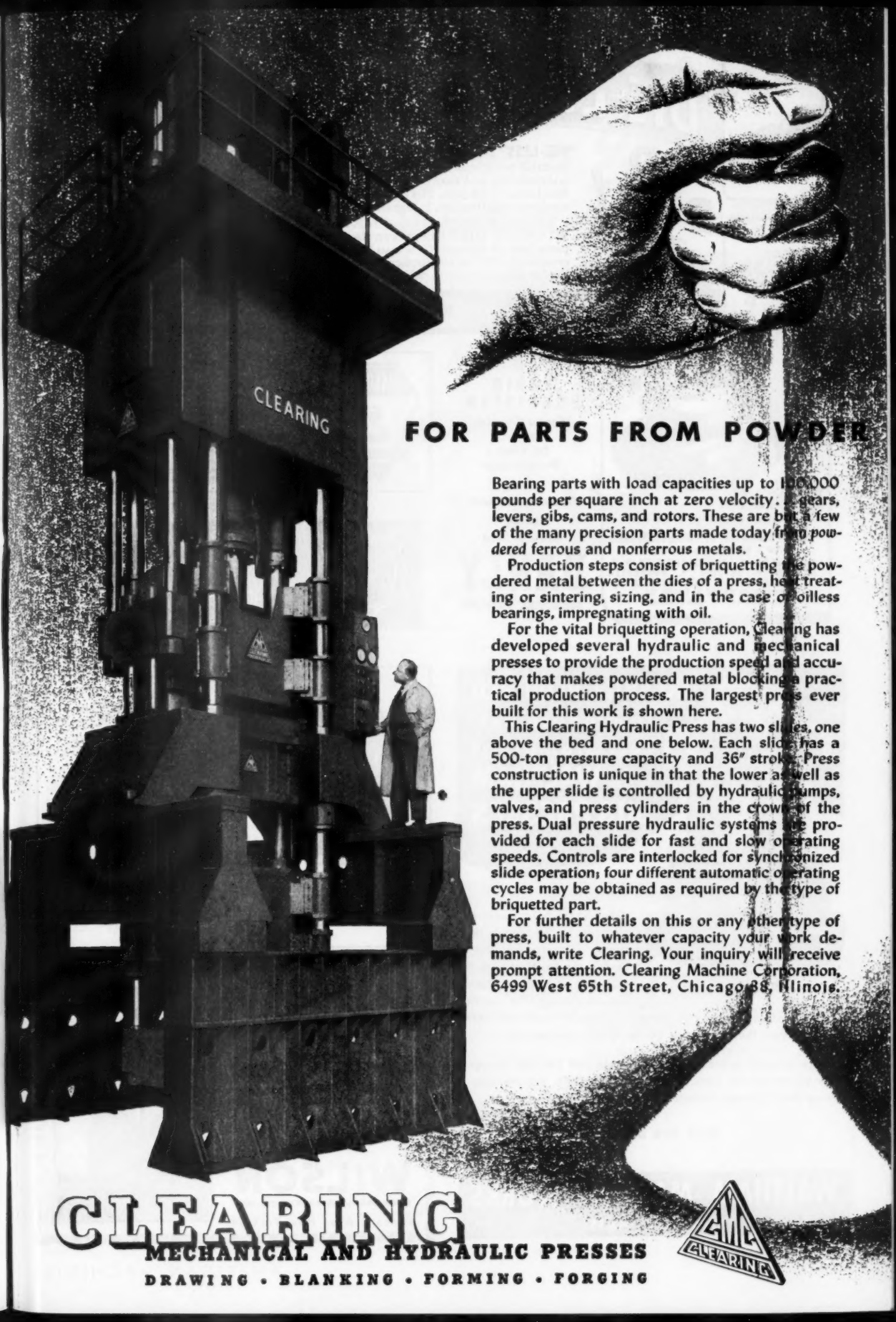

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For further details on this or any other type of press, built to whatever capacity your work demands, write Clearing. Your inquiry will receive prompt attention. Clearing Machine Corporation, 6499 West 65th Street, Chicago 38, Illinois.

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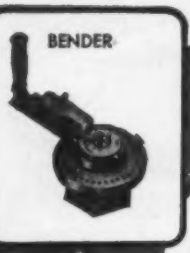

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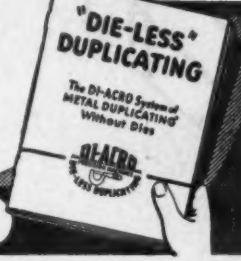

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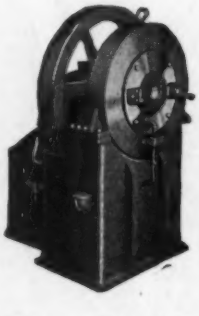

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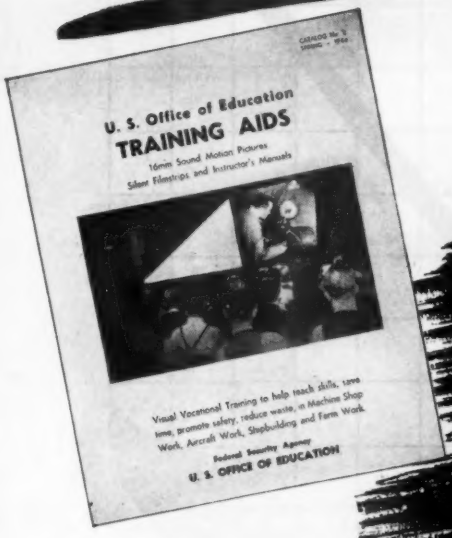
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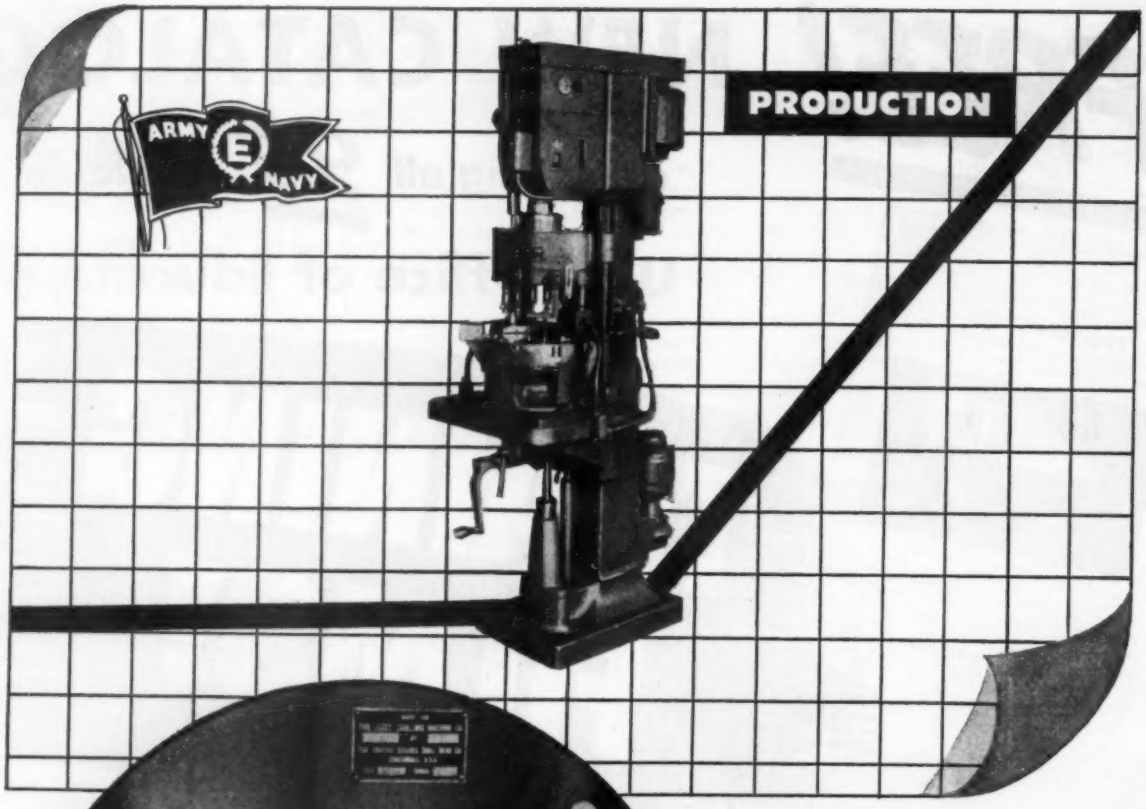

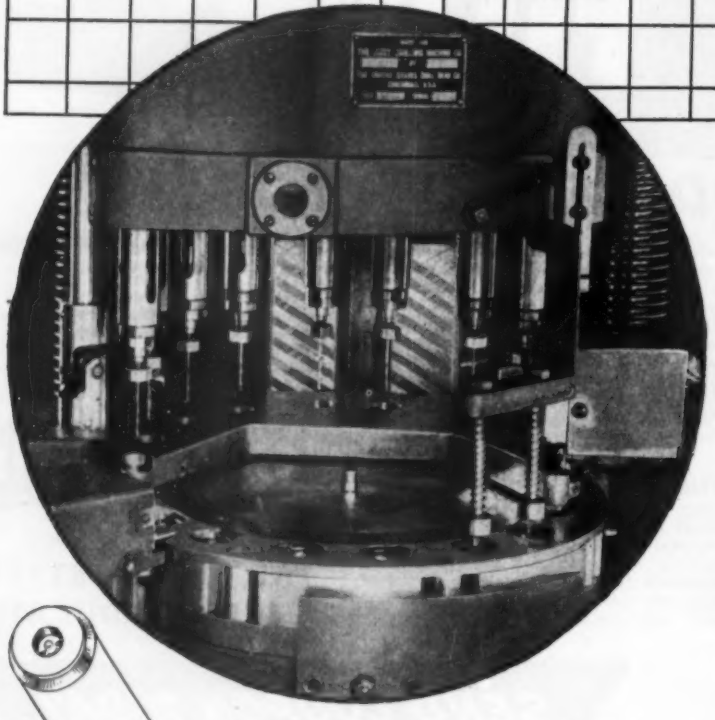

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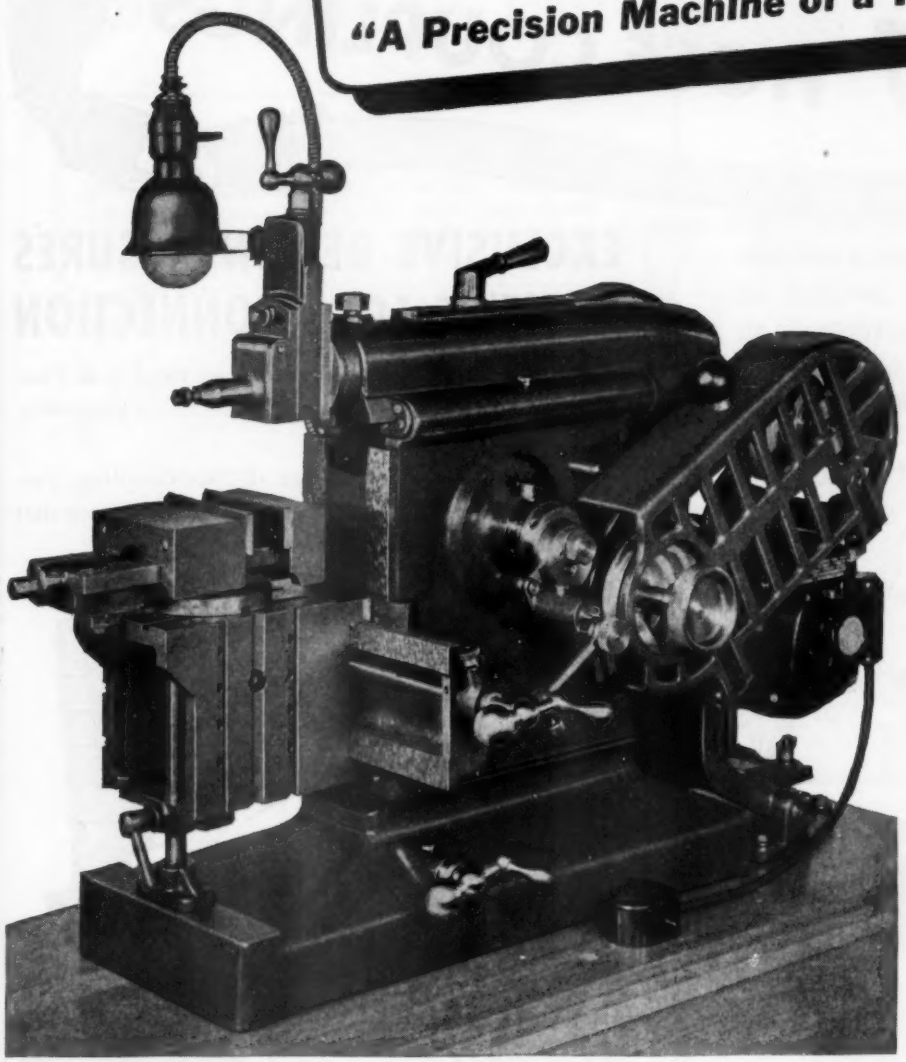

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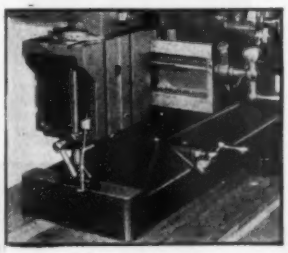
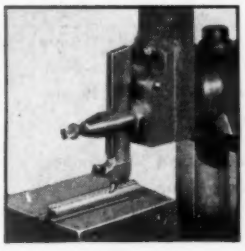
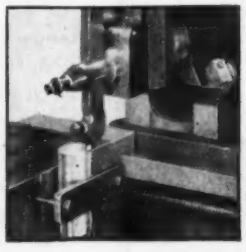
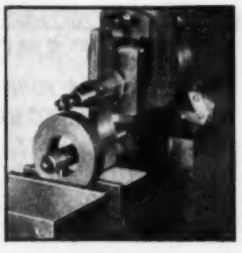
★

Has "VEE" Type Ways . . . Handles a wide variety of work . . . Accurate . . . Portable

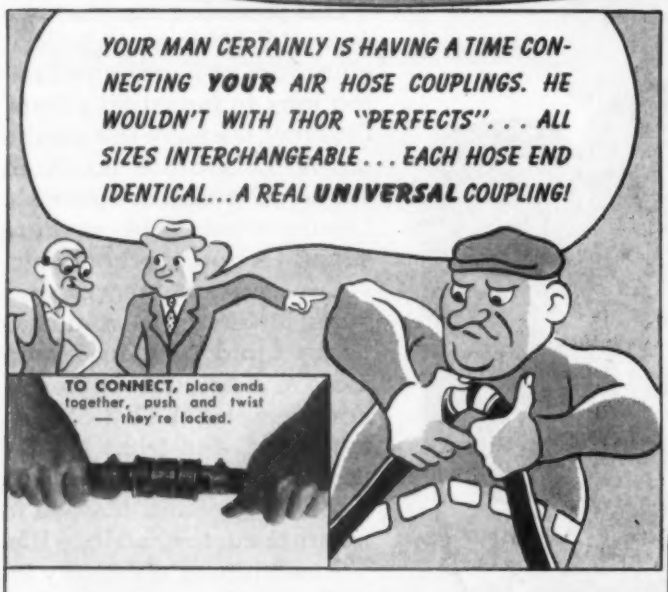
Write today for specifications and prices

ARMY E NAVY

AMMCO 2100 COMMONWEALTH AVENUE NORTH CHICAGO, ILLINOIS

SAFER!

Thor "PERFECT" HOSE COUPLINGS


YOUR MAN CERTAINLY IS HAVING A TIME CONNECTING YOUR AIR HOSE COUPLINGS. HE WOULDN'T WITH THOR "PERFECTS"... ALL SIZES INTERCHANGEABLE... EACH HOSE END IDENTICAL... A REAL UNIVERSAL COUPLING!
TO CONNECT, place ends together, push and twist — they're locked.

EXCLUSIVE DESIGN ASSURES POSITIVE-LOCK CONNECTION

Every month more and more roads are turning to Thor "Perfect" Air Hose Couplings as tests in the shop demonstrate their greater safety.

The ingenious, simple design of Thor Couplings provides a positive, unbreakable connection . . . yet one that can be locked and unlocked in a jiffy.

Thor "Perfect" Hose Couplings can save *you* time and trouble. Ask for a demonstration in your own shop . . . soon.

HOLY SMOKES!
TAKES A YOUNG ARMY TO YANK YOUR COUPLINGS APART. WITH A THOR COUPLING, A QUICK, STRAIGHT PULL ON SLIDING SLEEVES AND THEY DISCONNECT IN A FLASH!

ALL THESE OUTSTANDING ADVANTAGES!

Positively locked connection that won't break or come apart.

Greater safety — couplings cannot separate even if one lock becomes caught on something.

Truly universal—no right or left, male or female hose ends. Interchangeable in all sizes to ¾".

Longer life—they're made of alloy steel, heat treated for extra durability; specially processed to prevent rusting.

Quicker operation — *disconnect* by a simple pull on sleeves; *connect* by a straight push and slight twist.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

CHUCK-V-CHECK

A STITCH IN TIME FOR VICTORY

The chuck on your machine needs a LITTLE attention REGULARLY. Neglect of these rules will affect the accuracy of your work and cause "down time". Chucks are essential war production tools. "Keep 'em running to keep 'em flying."

V 1. Check lubrication on every shift.

V 2. Wipe surfaces . . . especially spindle noses and bearing surfaces . . . CLEAN of chips, etc. before mounting.

V 3. Never FORCE chuck on spindle nose.

V 4. Keep keyways, jaw bearings free from dirt, chips, etc.

V 5. Do NOT open jaws beyond outer edge of chuck circumference (use larger chuck if necessary).

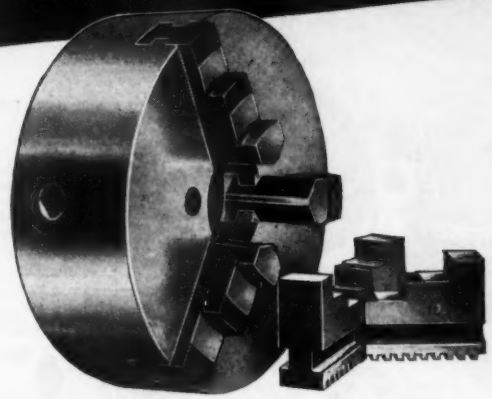
V 6. Use correct jaw equipment for work to be held.

★ ★ ★ CUSHMAN CHUCKS ★ ★ ★

A WORLD STANDARD FOR PRECISION

THE CUSHMAN CHUCK CO. HARTFORD, CONN.

TAKE CARE OF YOUR CHUCKS



AND THEY'LL TAKE CARE OF YOUR PRODUCTION!

Your Cushman Chucks are fine precision tools, manufactured to meet your most exacting production requirements over a long service life. But today, just as war production has to go far beyond the most optimistic estimates, so must we stretch the effective life of all tools including chucks.

That is why care is so vitally important. That is why we have made up and offer for your use the "Chuck Check" card. The simple practices suggested are obvious common sense, but with so much to be done in a day, even these points may be overlooked in your plant if they are not emphasized. Because this extra care will make your chucks last longer and do better work for you we suggest that the card be posted near every machine that uses a Cushman Chuck. We will be glad to supply a quantity for use in your plant.

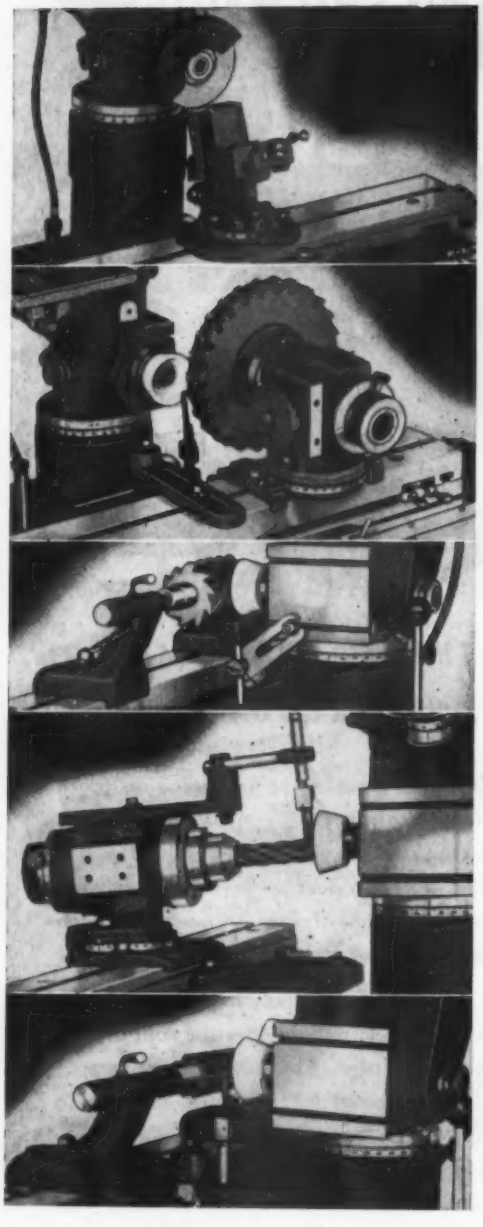
A WORLD STANDARD FOR PRECISION

ARMY NAVY

CUSHMAN CHUCKS

GRIND THEM RIGHT with the COVEL No. 12

Universal cutter and Tool Grinder



STRAIGHT FORM TOOL—
Tool is held in Covel Style G vise, 360° swivel base, tilting 90°.

FACE MILLING CUTTER—
is mounted on the arbor and placed in spindle, ground with cup grinding wheel. Hook tooth rest for accuracy.

SPIRAL MILLING CUTTER—
ground with cup grinding wheel. Adjustable curved lip rest mounted on head allows cutter to rotate without affecting grinding accuracy.

SPIRAL END MILL—
Top table swings 180°, allowing 3" more capacity between grinding wheel and universal face mill grinding attachment.

TAPER REAMERS—
Top table adjusted for correct taper. Has hand table lever and micrometer tooth rest.

Triple requirements are imposed on cutter and tool grinders in wartime. The production line demands sharper tools that will hold up longer. To save irreplaceable tool steel, tool-room managers insist that they be ground to finer tolerances. Superintendents want machines simple in operation for more rapid employee training.

The Covel No. 12 cutter and tool grinder was built to meet these conditions. Grinding wheel has three speeds, operated from a V-belt devised for quick change. The three-speed grinding wheel is driven by a V-belt accessible for quick change. Spring loaded precision ball bearings in the cartridge type spindle automatically take up expansion and wear, assuring accuracy. Safety factors are in-built to protect your operators.

Write for the full story of the Covel No. 12 Universal Cutter and Tool Grinder, in Bulletin A-94.

● ***Ask for the newly printed Covel instruction book on cutter and tool grinding. Price $1.***

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

ABRASIVE

No. 1½ HAND FEED SURFACE GRINDER

PROMPT DELIVERY

Hand Feed . . . ideal for short-run precision jobs. Motor integral with wheel head — no belts, sprockets or chains. Large hand wheels, conveniently located, permit continuous operation with minimum fatigue. Unusual capacity: 15" long x 10" wide x 12" high. ABRASIVE design and precision workmanship recommend the No. 1½ for the finest type of flat, form and gage grinding.

ABRASIVE

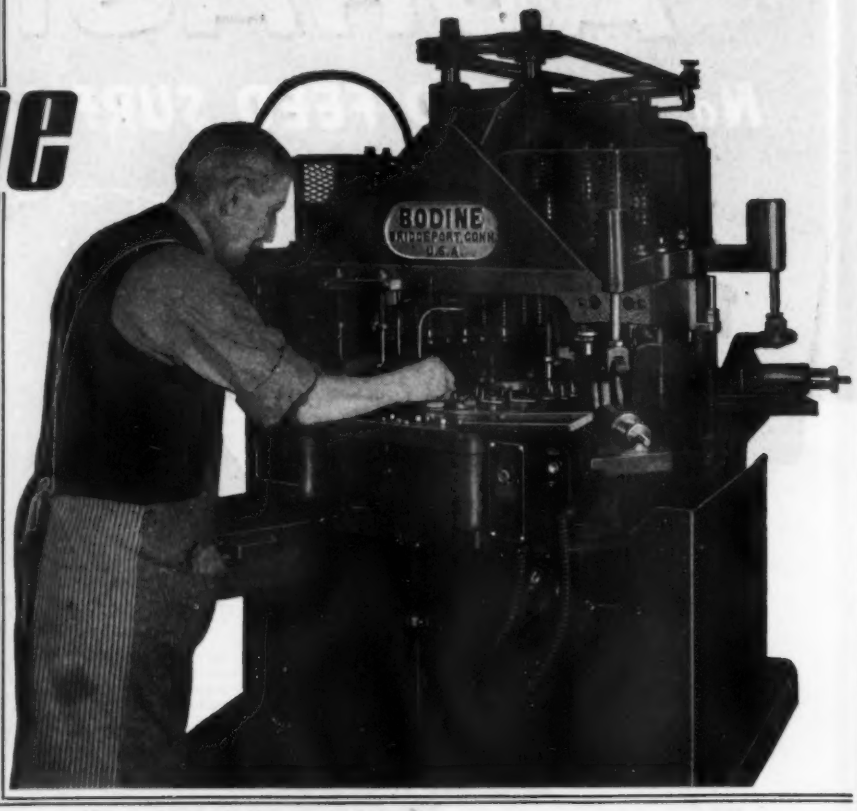
ACCURACY BOOSTS PRODUCTION

Send for Bulletin and Complete Specifications

ABRASIVE MACHINE TOOL CO • EAST PROVIDENCE 14, R. I. • *Dealers in Principal Cities*

Bodine

gets the most from MANPOWER



When you add to the 2 hands of a human operator the 8 mechanical hands of the automatic Bodine, it is evident that production of small parts is fast and profitable. In addition, the Bodine is extremely accurate.

Plants that have installed Bodine machines know why operator training periods have been reduced from MONTHS to WEEKS . . . why there's a minimum of down-time . . . how small parts production is greatly speeded, with low fatigue factor for operators . . . a valuable feature in the case of women and older men.

The Bodine basic design utilizes a horizontal indexing dial which carries the work to successive operating stations where vari-located tools—8 of them on the machine pictured above—automatically perform different operations during ONE cycle of the dial.

Plants that face re-conversion to peacetime production may find it advantageous to study the Bodine principle of operation. The BODINE BULLETIN shows in detail how small parts production can be speeded . . . how increased output can be obtained from the average operator. Write for a copy today.

DRILLING, MILLING, TAPPING, SCREW INSERTING *Simultaneously*

Bodine builds 6 sizes of this automatic indexing dial multi-spindle machine. They carry from 6 to 8 spindles, drill and tap holes from ½" dia. up to 3½" in depth. Tools may be set to operate vertically, horizontally, diagonally or from an inverted position, and will operate from all planes simultaneously.

Operator merely places the work in a clamp and removes it when the cycle has been completed. On certain types of work both feed and ejection may be automatic. Automatic safety devices protect machine, the tools and the work; assure safety to operator.

THE **Bodine** CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING AND SCREW INSERTING MACHINES

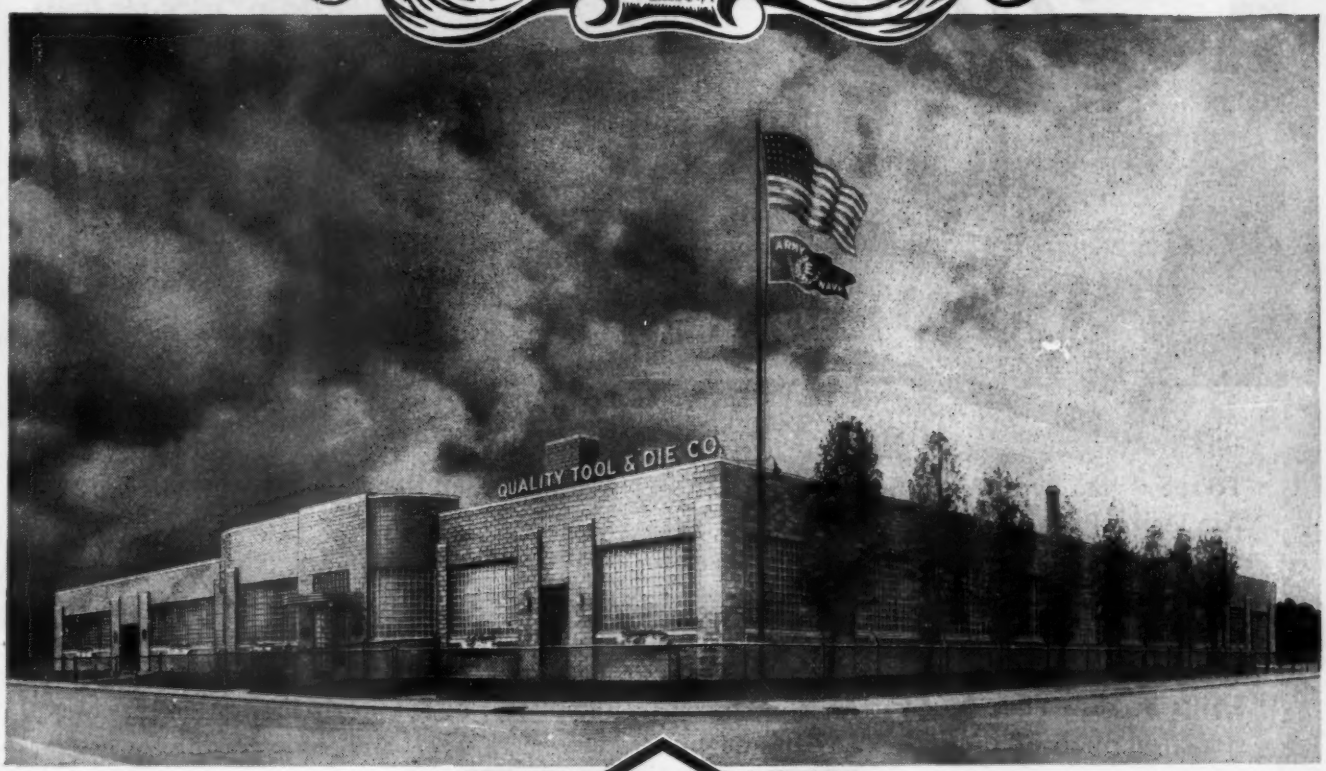
EST. 1929
QUALITY TOOL AND DIE CO.
REG. U. S. PAT. OFF.

EXPANDING

EXPANDING

TO MEET TODAY'S NEEDS AND TOMORROW'S OPPORTUNITIES

This newly enlarged plant provides our skilled executive and production personnel with facilities to fill the flood of war-time orders for "Quality" Precision Gages. These same proven facilities will be at your service in solving Post-War Tooling and Manufacturing problems.



Manufacturers of "QUALITY" Products

★ ★ ★

Speed Victory — Buy War Bonds

EST. 1929
QUALITY TOOL AND DIE CO.
REG. U. S. PAT. OFF.

405 N. NOBLE ST.
INDIANAPOLIS 2, INDIANA

Smooth POWER

FOR FAST, ACCURATE DRILLING

Thor AIR DRILLS

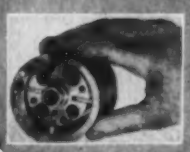
To speed your hard shipyard drilling jobs Thor Air Drills have *power* and plenty of it. It's *smooth* power, too, the smooth power that makes drilling highly accurate and precise . . . that gets the job done *right* as well as fast.

You get that smooth power with Thor Air Drills because Thor's compact, one-piece construction of rotor and shaft provides deeper blade slots and wider blades . . . to deliver power in a steady, even flow.

What's more, aluminum cylinders and malleable iron housings reduce both the size and weight of Thor drills. And they have a speed governor that controls and *minimizes* air consumption . . . automatic lubrication . . . heavy duty bearings . . . and triple gearing for greater torque reserve.

For helpful information on the complete line of Thor Air Tools for the shipyard, send for Thor catalog 52B.

WHY YOU GET *Smooth* POWER WITH *Thor* AIR DRILLS



Thor's one-piece construction of rotor and shaft, shown here, provides deeper blade slots and wider blades to give a *smooth* flow of power for faster, more accurate drilling.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

EMSCO reduces rejects with Axelson Lathes

Leading manufacturing firms, such as Emsco Derrick and Equipment Company, are discovering in today's production exigencies that Axelson Lathes save time and strategic materials by keeping rejects to a minimum.

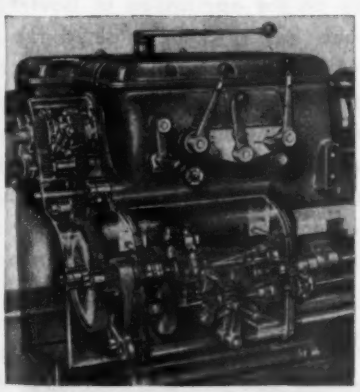
Adaptable to any turning problem, whether the heaviest roughing cut or the most delicate precision touch, Axelson Lathes incorporate features which insure high speed accuracy year after year. Skilled workmanship and top quality materials, combined with unexcelled ease of operation, will give you vital production step-ups.

New Bulletin No. 4401 gives detailed information on outstanding features of Axelson Lathes. Without obligation, send for a copy today. Discover for yourself there *is* a difference in lathes.

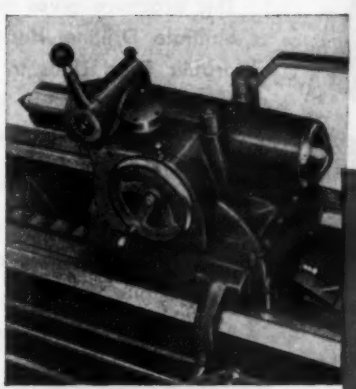
AXELSON MANUFACTURING COMPANY
6160 S. BOYLE AVE. (BOX 58 VERNON STATION)
LOS ANGELES 11, CALIF
50 Church St., New York City 7 • 3844 Walsh St., St. Louis 16, Mo.
204 Munsey Bldg., Washington 4, D. C.

AXELSON LATHES

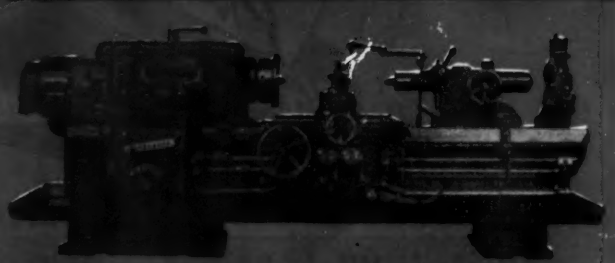
Dependable for over a Quarter Century



Easily operated headstock shift levers control 24 spindle speeds to give maximum efficiency under any working condition. Hardened and ground alloyed steel gears are engineered for smooth engagement and long wear under severe service. Mounted on anti-friction bearings.

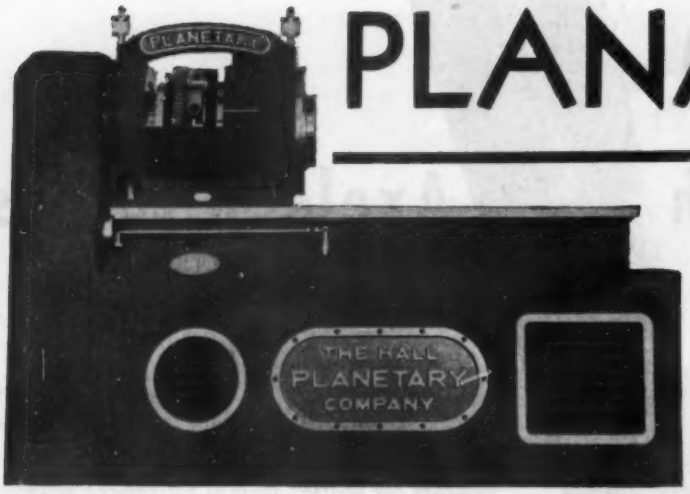


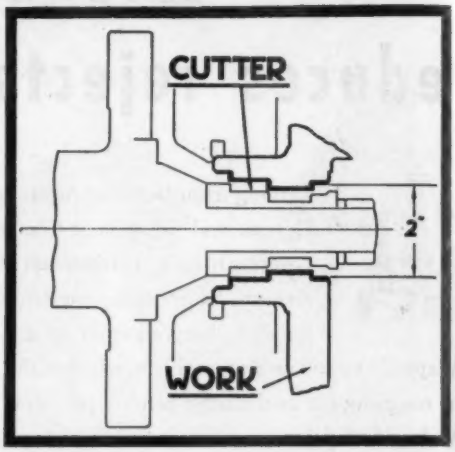
The 2-Speed Tailstock is an exclusive, patented feature which gives users of Axelson Lathes an important advantage. The added selection of speed and power makes Axelson one of the most versatile of all lathes.



Axelson Heavy Duty Lathes are made in 14, 16, 18, 20, 25 and 32-inch sizes, in various lengths. Skilled Axelson engineers, backed by 30 years experience, control every step of manufacture from drawing board, through foundry, to precision machining of each part and final assembly.

PLANAMILLING





HERE'S A DIFFICULT OPERATION
Performed in 3 Minutes

This job—one of milling airplane engine crankshafts—is a difficult one for several reasons. First, the material is very tough; second, the various bores must be held very accurately in relationship as to size; third, bores must also be accurately concentric with outside diameter.

A tough job—yes, but one that is easily handled with the PLANETARY method. And the time is only 3 minutes!

Consult our engineers on your production problems. PLANAMILLING or PLANATHREADING may be the solution. It will pay you to find out.

THE HALL PLANETARY COMPANY
Fox St. & Abbotsford Ave., Philadelphia, Pa.

THE HALL PLANETARY MILLER

····25 EXAMPLES OF MULTIPLE HOLE DRILLING IN *NEW* HOEFER BROCHURE

This brochure gives details on the application of Hoefer Multiple Drilling Heads and Hoefer Self-Contained Hydraulic Feed Units to a variety of Multiple Hole Drilling requirements. These examples give you a good idea of the developments possible with Hoefer equipment for successfully handling the most involved multiple hole drilling problems . . . faster, easier, and with greater economy. See how less expensive equipment does a bigger job — how many holes are drilled in the time it ordinarily takes to drill one hole.

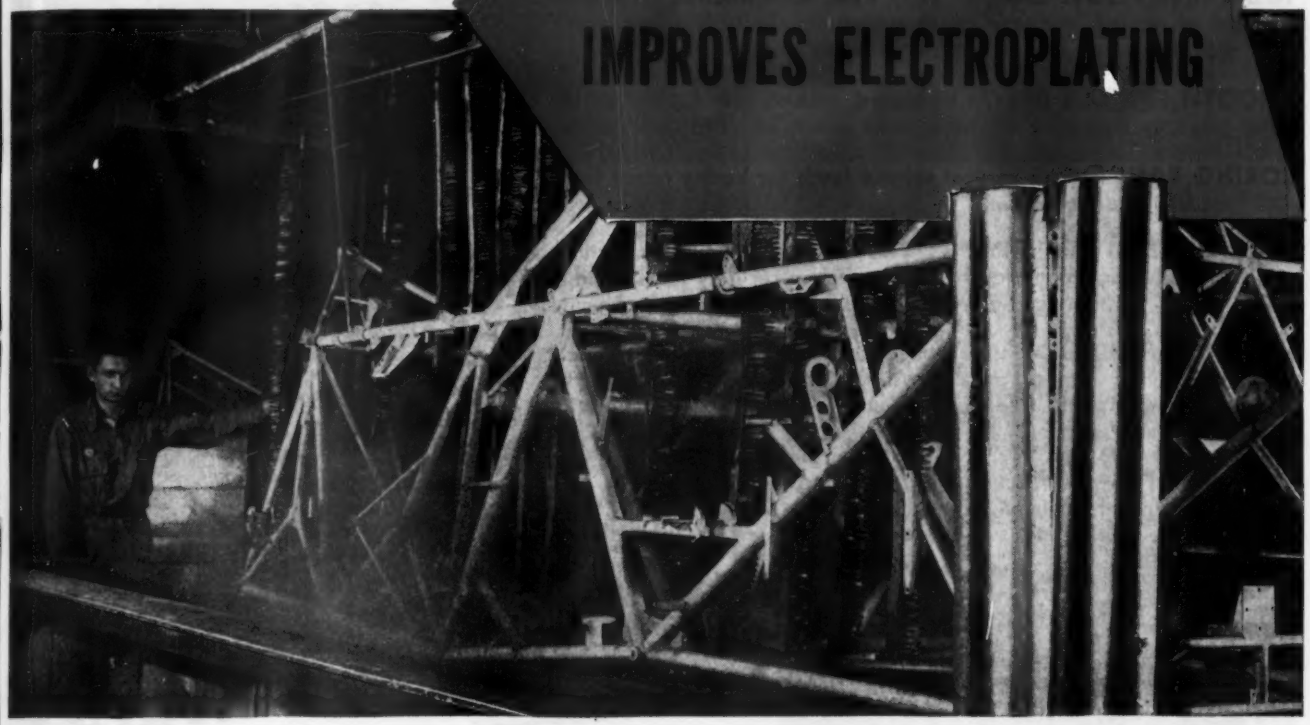
Write today for your copy.

Hoefer's Whole Business is Holes · · · · **HOEFER MFG. CO.** *Freeport, Ill.*

Prosolv *B*

offers outstanding advantages

NEW TURCO CLEANER IMPROVES ELECTROPLATING



Equally effective in still tank and electro-cleaning

So positive are the advantages of Turco Prosolv *B* that prominent electroplaters have switched to this new cleaner immediately following tests *although they had considered satisfactory the materials they had been using.*

Turco Prosolv *B* insures the chemical and physical cleanliness that is essential to 100% bonding to steel of zinc, cadmium, chromium and other plate. It removes every trace of oil, grease, smut, paint and rust preventive compound. It contains no soap; leaves no deposit. Rinsing is complete, even though parts may have dried.

A highly concentrated product, Turco Prosolv *B* is 100% active. Every particle works; there is no waste.

As this new cleaner is effective in both still tank and electro cleaning, it simplifies stocking and plant procedure where both processes are employed.

Try Turco Prosolv *B* for stripping tin deposits formed during certain electro-pickling processes. A standard cleaning tank may be used for this.

Call the Turco Field Service Man for details on this specially formulated electro and still tank cleaning material which is doing such a notable job the nation over. Write today.

Follow Prosolv *B* with Turco Descaler This second step in preparing steel for plating is as necessary to a perfect job as the primary cleaning operation in Prosolv *B*. Any rust, mill, welding or heat-treat scale will prevent bonding of plate. Turco Descaler removes these without attacking the base metal. Thus the combination of Turco Prosolv *B* and Descaler insures quality plating at low cost. Let us furnish full details.

Rust Bar treatment for unplated portions. Partially plated parts, if treated with Turco Rust Bar, are well protected from corrosion during indoor storage although subjected to severe conditions. A thin film of Rust Bar is resistant not only to airborne water vapor, but also to corrosive gases and other types of corrosive agents.

TURCO

Turco

PRODUCTS, INC.

Write Dept. AM-4

SPECIALIZED INDUSTRIAL CHEMICAL COMPOUNDS

MAIN OFFICE AND FACTORY: 6135 SOUTH CENTRAL AVE., LOS ANGELES 1 • SOUTHERN FACTORY: 1606 HENDERSON STREET, HOUSTON 10, TEXAS • CHICAGO OFFICE AND FACTORY: 125 WEST 46TH STREET, CHICAGO, ILL. • SERVICE MEN AND WAREHOUSE STOCKS IN ALL PRINCIPAL CITIES

Construction Features that Contribute to...

- ★ VERSATILITY
- ★ SPEED
- ★ ABILITY
- ★ ACCURACY
- ★ RIGIDITY
- ★ ACCESSIBILITY and LOW COST
- ★ PERFORMANCE

POSITIVE CONTROL: Multiple dry disc clutch and leather faced brake in main spindle drive gives operator positive control with flexibility to allow "inching" spindle.

16 SPINDLE FEEDS: Gears of alloy steel, heat treated, finish machined and shaved, mounted on short, ground shafts and ball bearings, provide sixteen spindle speeds, in either direction.

SMOOTH SPINDLE DRIVE: Hardened, ground, and lapped spiral-bevel gears, ball bearing mounted, make sure a smooth spindle drive.

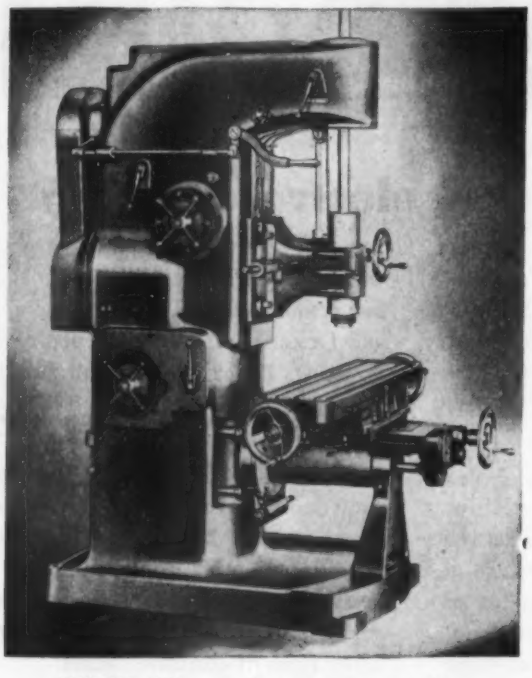
BORING RANGE: Four vertical spindle feeds for boring range from .002" to .010" per revolution.

SPINDLE HEAD SECURELY LOCKED: Positive, quick acting spindle head clamp controlled by a single lever, securely locks spindle head in any position on accurately fitted slide on face of column.

MAIN SHAFT: Single, constant speed motor drives main shaft through multiple V-belts. Compact and accessible. Motor and drive entirely enclosed for safety and cleanliness. Guard easily removed for servicing or adjustment.

TABLE UNIT: A post, accurately ground and rigidly fitted into the column, forms the bearing on which the table unit swivels around the column.

ALL-PURPOSE KNIGHT-Millers



KNIGHT Millers are fast, compact, complete and convenient to handle. Write for our catalog that pictures and describes various jobs being done.

TILTING TABLE: Large trunnion, on which is assembled the table unit, provides for tilting table in either direction. This feature and the one above add to the capacity of the machine.

35° TILT: The knee, actuated by large worm and gear, may be tilted 35° either side of horizontal thereby placing the table in position for angle boring or milling. Four heavy T-slot bolts solidly lock it in any position.

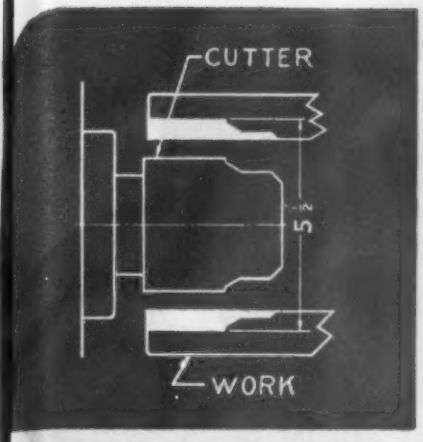
SAFETY FEATURE: Automatic safety throwout, built into feed mechanism, provides against over-loading and will not allow re-engaging table feeds until overload is removed.

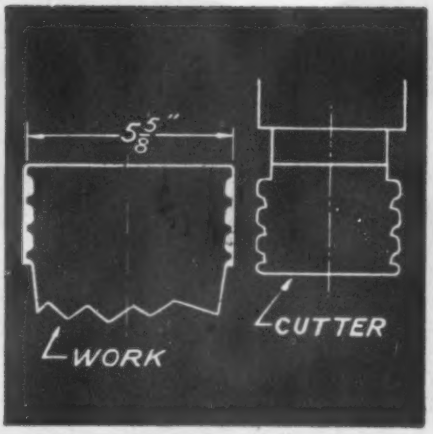
MAINTAINING SQUARENESS: Eccentric bushing, in outer table unit support bearing, furnishes additional means of maintaining squareness between table and spindle.

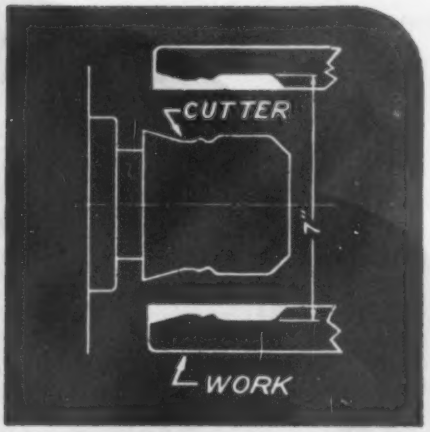
POSITION OF UNIT IN DEGREES: Large worm for operating gear that tilts table unit. Graduated segment on right side of unit gives position of unit in degrees.

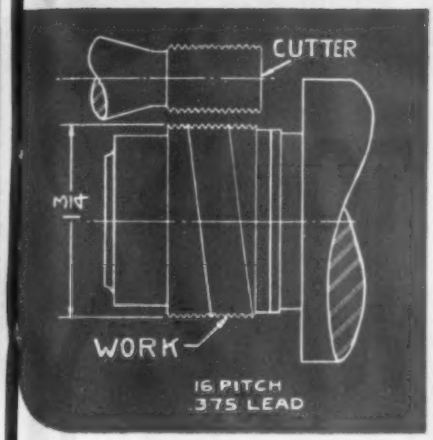
KNIGHT Millers subject to prior order for immediate delivery. Write for catalog.

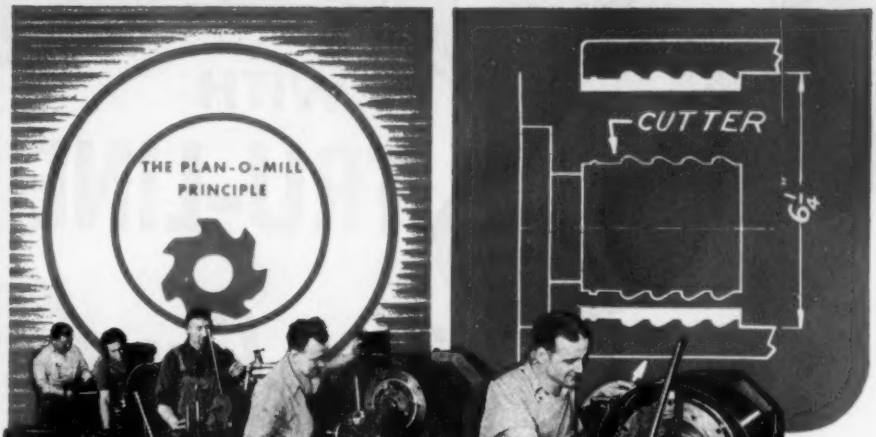
W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •











For Victory Today—
Prosperity Tomorrow—

LOOK TO PLAN-O-MILL

For exceptional speed, accuracy and finish—at a saving of money, metal and manpower—look to Plan-O-Mill!

Plan-O-Mill provides a *better* method of form and thread milling. Plan-O-Mill offers outstanding rapid-production features, including General Electric's Thy-mo-trol for separate and complete control of feed-in and feed-around. Plan-O-Mill requires a minimum of skill to operate, a minimum of operator attention.

Shown above are typical examples of Plan-O-Mill production applications. If your war or post-war products involve internal or external threading or cylindrical forming, replace obsolete, wasteful machines with Plan-O-Mill. Contact your machinery dealer or write direct.

First

PLAN-O-MI

FIRST to install General Electric's remarkable new Thy-mo-trol—electronic feed control!

FIRST planetary to mill external threads with standard multiple thread cutter!

FIRST planetary to coordinate feeds and speeds!

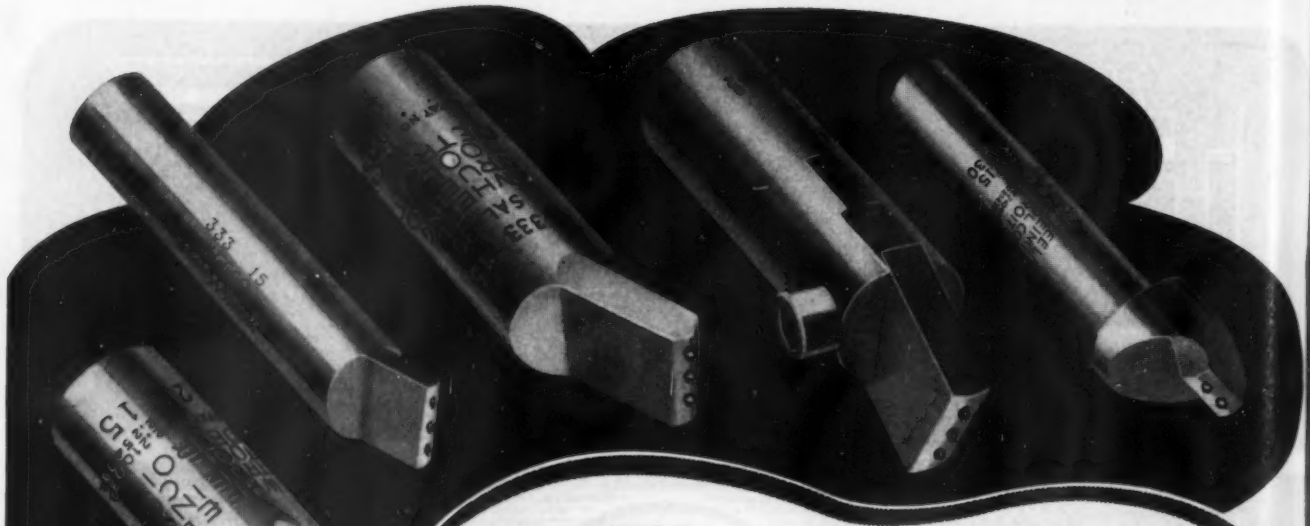
FIRST to provide absolute control of

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD • HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-CD MILLING CUTTERS



WITH TRU-LINE TOOLS You Save 4 WAYS!

TRY a TRU-LINE Engineered Diamond Tool and you'll learn first hand why production men everywhere are turning to TRU-LINE. For TRU-LINE Diamond Tools engineered to your job will give you all these savings in time and money:

YOU'LL SAVE because the TRU-LINE multiple diamond tool requires no turning. That means less machine down time—greater production.

YOU'LL SAVE because of the unique feature of placing the diamonds in overlapping rows. This provides a continuous cutting surface for the life of the tool.

YOU'LL SAVE because the thin blade that dissipates heat rapidly is made of our own alloy that forms a rugged, chemical bond with the diamonds, thus permitting the diamonds to be used up entirely.

YOU'LL SAVE because the use of smaller, high quality, carefully selected diamonds means much lower tool costs.

There is a TRU-LINE Tool for every type of straight, profile or step dressing operation—one that will bring to your job faster production, greater accuracy and remarkable savings in wheel dressing costs. Try one TODAY!

WHEEL TRUEING TOOL COMPANY

3200 W. DAVISON AVE.
DETROIT 6, MICHIGAN

HAVE YOU RECEIVED A COPY OF THIS BOOK?

It gives complete details, illustrations and prices of this complete line of money-saving diamond wheel dressing tools. Write for your free copy today.

★ ★ ★

Are you giving proper consideration to your tool bit requirements . . .

TOOL BITS produced by different makers may *look* somewhat alike—but that's where similarity ends! The difference is in *quality*—in *performance*—and in the field of high speed steel Ground Tool Bits and Turning Tools, the name GORHAM has long been recognized by industry as "Tops".

This reputation came through consistently producing tools of superior quality—through long experience in the selection and heat treatment of materials to produce the proper tool for the particular job.

For example, when increasing use of Molybdenum high speed steels called for Super Molybdenum tools and bits with performance characteristics comparable with Super tungsten high speed steel, it was GORHAM'S "know-how" and experience which made possible the M-40 series—now widely used all over the country.

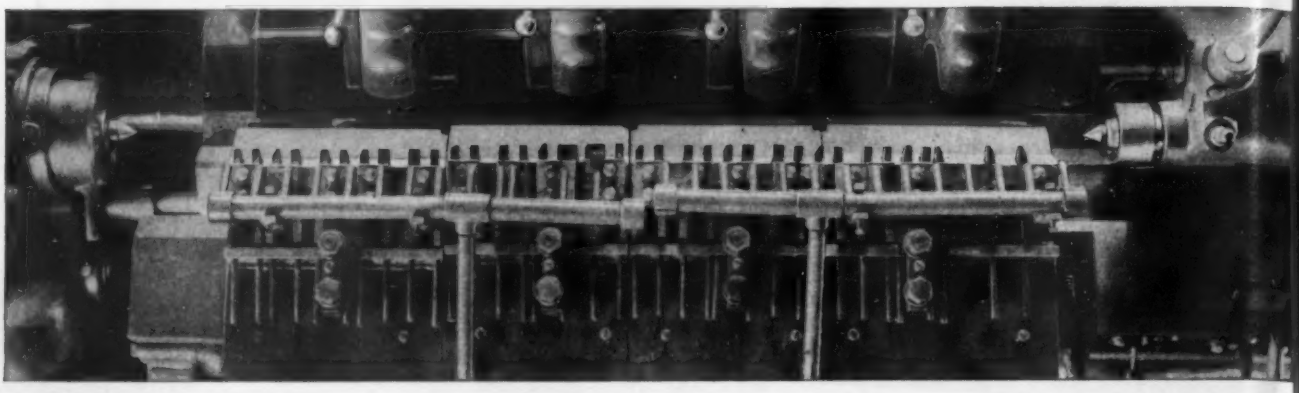
In manufacturing Ground Tool Bits and Turning Tools, GORHAM uses oversize hot rolled bars and cuts them to standard length. By soft grinding the annealed stock, the scale and decarbonized surface is removed, preparing the steel for hardening. After a closely controlled heat treatment, the blanks are again ground square and to size to remove any decarbonized surface. You get an *accurately-ground, uniformly hardened,* ready-to-sharpen tool!

CATALOG UPON REQUEST

GORHAM TOOL COMPANY

14400 WOODROW WILSON • DETROIT 3, MICHIGAN

Lo-swing LATHES ON CAMSHAFT WORK



● Lathe work on forged camshafts is usually divided into two or three turning operations: First, the squaring of the sides of the cams, gears and bearings; second, the turning between cams, and third, special machining operations when required.

The above illustration shows the type of tooling used for the squaring of all cams, bearings, gears, etc., in a single operation — thereby assuring the close accuracy required in the spacing of cams on modern aircraft and other types of internal combustion motors.

The squaring tools are usually mounted in 4 cam-controlled slides, each slide timed to feed in a pre-determined sequence. Thus, in the case illustrated above only one set of tools is cutting into the line bearing at any time thereby eliminating any danger of twisting or setting up strain in the shaft. Note the four sturdy roller steady rests for supporting the work and taking the cutting pressure from the tools. These rests are of the hinged type to facilitate loading and unloading.

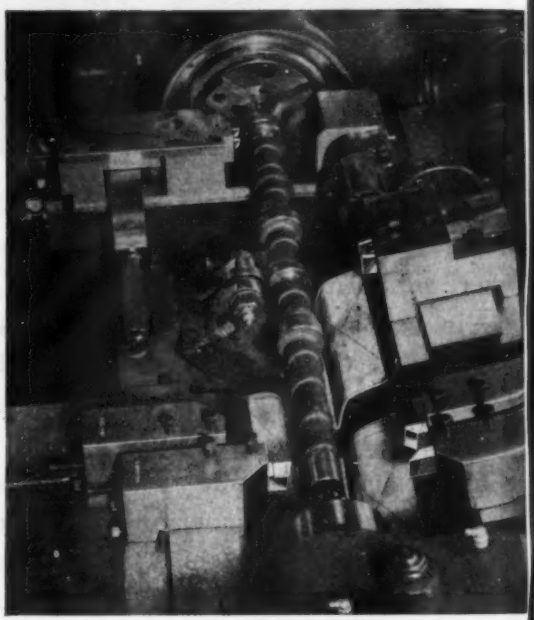
Illustration at the right shows a Lo-swing Lathe tooled for a secondary operation and equipped with a 2-speed head and automatic control. This arrangement provides the high speeds necessary for finish turning and squaring operations with cemented carbide tools and the low speeds required for an eccentric grooving operation. The lathe automatically shifts from high to low speed and the cam roller on the double eccentric grooving attachment is automatically withdrawn from the cam path during the high speed portion of the cycle.

Another interesting feature of this machine is the 2-slide carriage which accomplishes both roughing and finishing cuts on the small bearing. The roughing tool on the front slide relieves from the work before the tool on the second slide moves in for the finish cut.

Lo-swing engineers are anxious to help you with your camshaft turning problems and will be glad to prepare tool layouts and submit complete data.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

Removing approximately 1/16" of material from the sides of cams and on radius of line bearings of a forged camshaft; slide No. 1 (nearest tailstock) feeds in first; slide No. 2 follows 3/32" late to allow No. 1 slide to start backing out before No. 2 enters the cut on the line bearing. Slides No. 3 and 4 are likewise timed 3/32" late in their movements.



Lo-swing Lathe equipped with a standard two-slide carriage, two back squaring attachments, front steady rest, double eccentric grooving attachment and automatic two-speed head. Operations: cutting a double eccentric oil groove on the head bearing, rough and finish turning and chamfering the small end bearing, and facing and chamfering oil pump drive gear.

LATHE NEWS *from* SENECA FALLS

HERE'S THE

New Model Nichols Miller

Here's the New Model of one of the most versatile precision milling machines on the market.

Besides conventional milling, the Nichols Miller performs dozens of unusual operations—such as profiling, boring, facing, diamond wheel-grinding—*to tolerances in tenths.* Rise-and-fall spindle arrangement and a full line of attachments make the Nichols especially valuable for the toolroom or laboratory.

Worth remembering: Several thousand of these millers are in operation the world over—and we've never required a full-time service man!

WORKING SURFACE: 6¾" x 21", or 6¾" x 30". RANGE: Longitudinal, 10" or 19"; Transverse, 7"; Vertical-Knee, 13½"; Spindle Rise and Fall, 4½". STANDARD SPEEDS: to 2400 RPM. SPECIAL SPEEDS: to 5000 RPM.

Also Available—Nichols Millers for special requirements. Nichols Double-Spindle Millers for high-production needs.

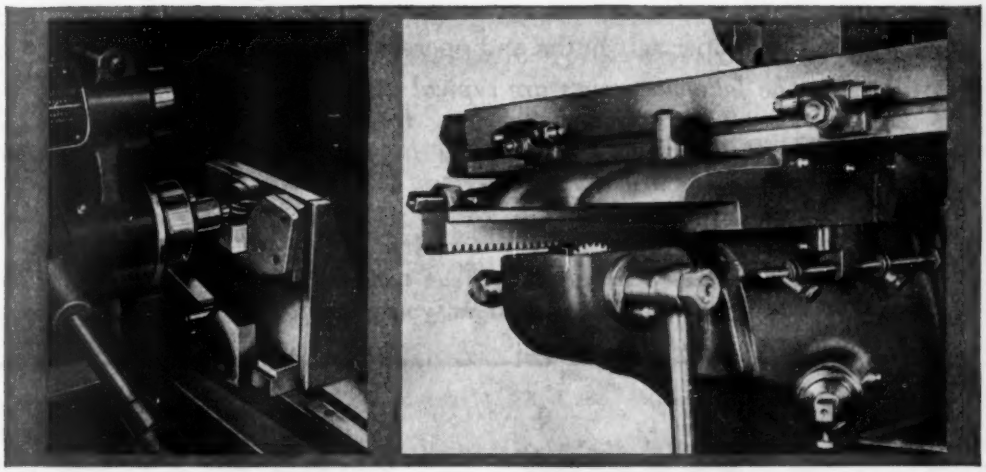
Immediate Deliveries—Send today for descriptive literature and free 86-page Handbook of unusual applications.

EXAMPLES OF NICHOLS VERSATILITY

(Left to right)

PROFILE MILLING, using template and follower, with remarkable ease of control, work-piece under full view.

RACK AND PINION TRANSVERSE FEED, available in place of standard feed screw for rapid motion on drilling, end-milling and boring operations.



Manufactured by W. H. NICHOLS & SONS, Waltham, Mass.

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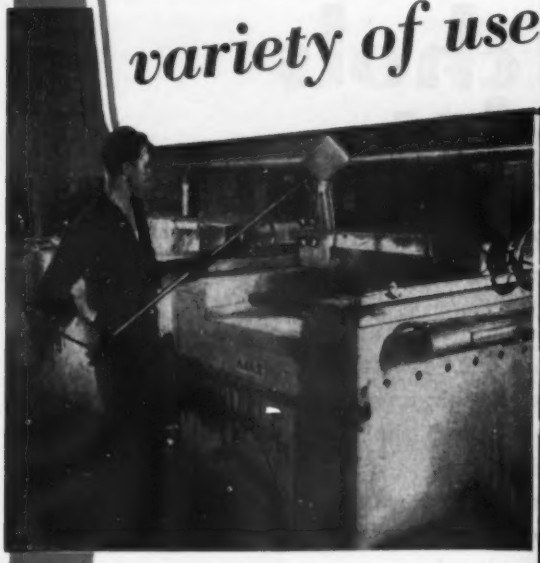
NICHOLS-MORRIS CORPORATION

50 CHURCH STREET, NEW YORK 7, N. Y.

Industry finds wide variety of uses for •• Park Neutral Salts



★ *SMALL FURNACE—Neutral Salts used in hardening miscellaneous parts.*

★ *LARGE FURNACE—Fuse bodies and boosters hardened, quenched and drawn in salt baths.*

NEARLY EVERY DAY brings additions to the variety of parts heat-treated in neutral salt baths.

This trend was accelerated by the introduction of N.E. Steels, which require close temperature control and strict uniformity of heat treatment to produce the highest physical properties and maximum service performance.

Park's service metallurgists and research laboratory staff have rendered invaluable assistance to a large number of manufacturers by their development of proper salt baths and operating procedures.

The following parts are typical examples of parts heat treated by Park's neutral salt baths: Aircraft Parts, Automotive Parts, Tank Parts, Gun Parts, Truck Parts, Fuse Bodies and Boosters, Shells, Cartridge Cases, Gears, Hi-Speed and Carbon Tools, Screws, Bolts and Studs.

★ ★ ★

If you have a problem of heat treating any of the above, consult the Park Service Metallurgist in your territory—write or wire us direct.

Park

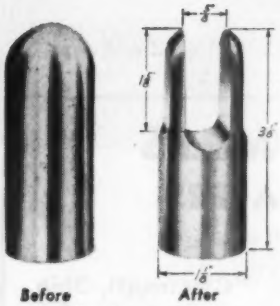
PARK CHEMICAL CO.

Liquid and Solid Carburizers ☆ Cyanide, Neutral and High Speed Steel Salts ☆ Lead Pot Carbon ☆ Charcoal ☆ Coke ☆ No Carb. ☆ Carbon Preventer ☆ Quenching and Tempering Oils ☆ Drawing Salts ☆ Metal Cleaners ☆ Liquid Grain Cement

8074 MILITARY AVE. DETROIT, MICH.

INCREASE MILLING PRODUCTION without Added Men or Machines!

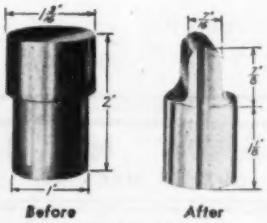
MODEL 10-E
Pat. Applied for



Before *After*

Aluminum Parts

These aluminum parts were milled upon the Aerco Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



Before *After*

Chrome Steel Parts

These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aerco Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aerco Multi-Grip Chuck show its versatility.

with the AERCO HYDRAULIC MULTI-GRIP CHUCK

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

Aerco Multi-Grip chucks may be used for both vertical and horizontal milling. Work is held rigidly in collets and cannot turn or be pulled out during milling operation, however clamping pressure is instantly releasable and self-opening collets can be quickly re-loaded.

Collet sizes range from ⅛" to 1¼" and are available in round, square or hexagon shapes.

Representatives Wanted in Principal Cities

MANUFACTURED EXCLUSIVELY BY

AERCO CORP.

HOLLYDALE, CALIFORNIA

ARMY E NAVY

WRITE FOR NEW FOLDER

Bridgeport

TURRET MILLING MACHINE

MILLS, DRILLS, BORES *and* SHAPES AT ALL ANGLES WITHOUT CHANGING SET UP

This universal machine is many machines in one. Its versatility and scope of operations are without parallel. Equipped with the universally used "Bridgeport" Milling Attachment, milling, drilling and boring at all angles can be handled at a single set up and with utmost precision.

While furnished as standard equipment on the Bridgeport Turret Milling Machine, the Bridgeport High Speed Milling Attachment can be mounted on any type of milling machine as well as special production equipment.

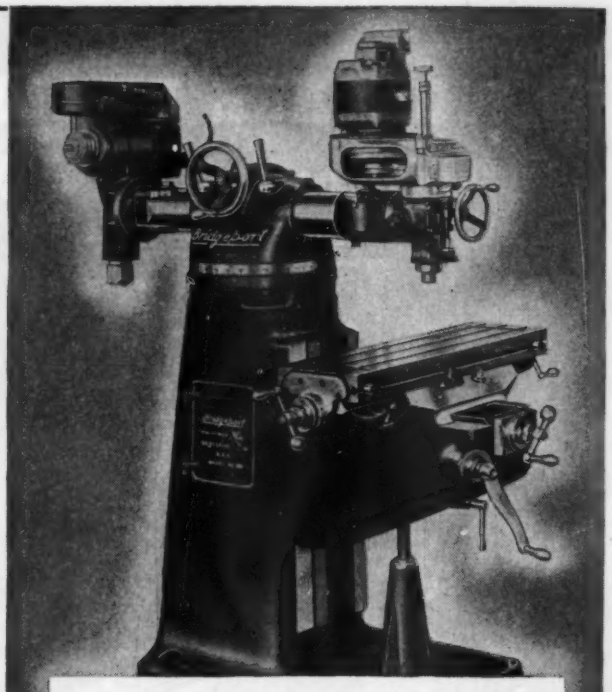
. . . *and* NOW A SHAPING ATTACHMENT

Tremendous demand for Bridgeport Machines has delayed until now the production of this much needed Shaping Attachment. It is now available not only to owners of Bridgeport Turret Milling Machines but also to machines of other manufacturers.

The Bridgeport Shaping Attachment (mounted on back end of overarm) provides the means for shaping and slotting at all angles and on a wide variety of work such as dies, mold work and intricate production jobs. It is of sturdy construction and convenient to use.

Write for Illustrated Bulletins giving complete details

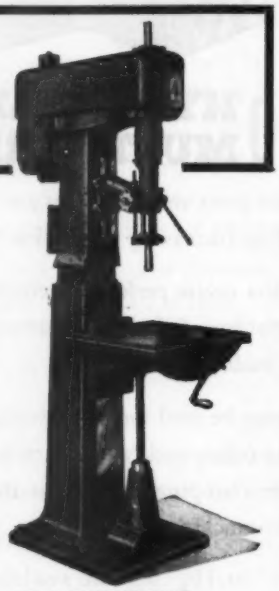
THE BRIDGEPORT MACHINES, Inc., Bridgeport, Conn.



Specifications

MACHINE	MILLING ATTACHMENT
Longitudinal Feed—20" Cross Feed—9" Vertical Feed of Knee—16" Spindle to Table—17" Table—9" x 32"	Spindle Speeds, 275, 425, 700, 1050, 2100, 4250 Quill Travel—3½" No. 2 Morse or No. 7 B&S taper spindle ½ HP Motor

REED TYPE 50
Variable Speed
SENSITIVE DRILLS



Streamlined for efficiency and simplicity

Designed for speed and ruggedness, with drive fully inclosed for safety, these machines will handle a wide range of work with utmost precision. Drive is direct by single belt from motor to spindle through variable speed transmission which provides an instant and infinite speed range from 1500 to 10,000 R.P.M. Spindle is fully mounted on precision ball bearings.

Available in from 1 to 5 spindles, each spindle being driven by individual motor and belt.

•

Send for illustrated folder giving full information.

SPECIFICATIONS

Capacity—¾"
Spindle Travel—6"
Head Adjustment—6½"
Table—15⅜" x 16"
Dia. Spindle—⅞"

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.

SMITH & MILLS
CRANK SHAPERS

sizes 12" to 32" stroke

THE SMITH & MILLS CO. Cincinnati, Ohio

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

The NEW "ABRASAW" No. 47
CUT-OFF MACHINE

This pedestal type machine — improved and streamlined in appearance and construction — provides machine and base in a single casting. Large coolant tank is now in base of machine with coolant pump at the rear.

Vises can be furnished for straight or combination straight and angle cuts.

Capacity: Solids up to 1"; tubing and light sections up to 2".
Floor Space: 28" x 50".

Send for complete details.

THE BRIDGEPORT SAFETY EMERY WHEEL CO.
1286 W. Broad St., Bridgeport, Conn.

GROUND WITH THE SCIENTIFICALLY CORRECT SELLERS POINT

TYPE 6-G

That's the beauty of Sellers Drill Grinders. With less than a day's instruction a fair-haired novice can become a white-haired expert. He (or she) depends not upon individual skill but on the *automatic* locating of the drill in the chuck to produce a correctly formed point.

It is obvious that the Sellers Drill Grinder reduces drilling costs by turning out free cutting, accurate drills that can be operated at most efficient speeds, thus greatly increasing the number of holes per grind . . . It lengthens drill life and reduces drill *inventory* . . . It provides you with drills that produce truly cylindrical holes and maintains a constant supply of correctly sharpened drills at all times.

For proof of why it will pay you to equip your tool room with this modern machine, send us three drills of any size up to 3 ins. and we will return them ground with the Sellers point. No charge, no obligation. Wm. Sellers & Company, 1614 Hamilton St., Philadelphia.

CABINET TYPE 1-G

1943, Wm. Sellers & Co.

SELLERS PRECISIONEERING SINCE 1848

left: A Campbell Abrasive Cutting Machine cutting aluminum bar stock on war production job.

below: A Campbell is used for precise job of cutting in plant of nationally-prominent manufacturer of bearings.

An important tube cutting job in an aircraft factory on the Pacific Coast.

Precision set-up on a manually-operated Campbell in a war production plant.

WHAT IS *YOUR* CUTTING JOB?

These 4 **CAMPBELL ABRASIVE CUTTING MACHINES** are all different. Each is cutting different stock to different dimensions—none limited to the job it is doing.

CAMPBELL has the only complete range of Abrasive Cutting Machines—cutting annealed and unannealed steels, non-ferrous alloys, plastics, glass and ceramics—solid bar, tubular and flat stock.

What are you cutting? **CAMPBELL** can give you a procedure that will do the work better, make it easier to meet schedules and lower costs.

Get further information by writing the Andrew C. Campbell Division. State what material you are cutting, length of pieces before cutting, length of cut-off pieces and production required per hour.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT • CONNECTICUT
ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

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IT'S IN THE *Air!*

AIR CONTROL is the Secret of precision tapping The Haskins Way

Accuracy—to a class 4 fit when necessary—is constant—each part is tapped exactly like every other, independent of operator efficiency. AIR regulates the complete tapping cycle—not only the down stroke, but its control is so sensitive that the tap is allowed, in effect, to float out of the part. Tap life is longer—tap breakage practically eliminated. Send today for your copy of catalog on Tapping—The Haskins Way. R. G. Haskins Co., 2761 W. Flournoy St., Chicago, Illinois.

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PRECISION TAPPING EQUIPMENT

Is this YOUR Cleaning Problem?

PREPARING ZINC FOR CHROMATING

If you are using the Cronak process or similar chromating techniques for protecting zinc alloy die castings, zinc-plated parts or galvanized surfaces against corrosion, you know that the FIRST essential step is a CHEMICALLY CLEAN surface.

That is why it will pay you to investigate Oakite materials that have been scientifically designed to completely free surfaces of grease, dirt, oxide and other contaminating elements . . . without harming zinc coating. You will find they do the job quickly, easily . . . economically, too! Details FREE. Write TODAY!

OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives Conveniently Located in All Principal Cities of the United States and Canada

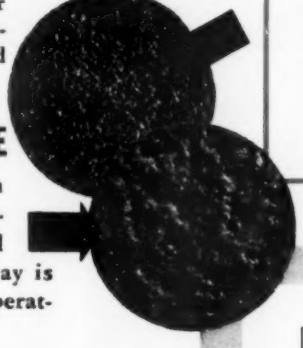
OAKITE CLEANING

"*When the Por-os-way people figured we could boost grinding production on chrome molybdenum tubes I laughed . . . but too soon. Por-os-way not only doubled production but eliminated tube warpage due to heat generation of previous wheels. It also required less dressing.*" This is not an isolated case. The fact is, Por-os-way usually produces so much faster when first tried that operators, satisfied with a reasonable improvement in results, don't push this wheel to the limit of its possibilities. Don't be easily pleased. Send for the Por-os-way booklet with the "prescription" blank for ordering a test lot. Then try THIS wheel and give it the works!

Por-os-way engineers pioneered in adopting the open structure wheel for precision finishing. And yet the SAME wheel—at a deeper cut—can often be used for rough grinding as well as finishing, ending time wasted in wheel changes and additional finishing steps.

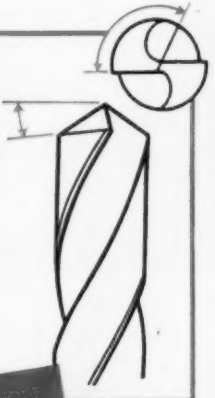
THIS MAKES the DIFFERENCE

You can spot the difference between an ordinary wheel (top) and a Por-os-way wheel (bottom) with the naked eye. The extra porosity of Por-os-way is the reason for more than 8 distinct operating advantages.



CHECK FOR CHIP CLEARANCE

Any cutting tool, a twist drill for example, requires clearance to remove stock without interference. Por-os-way's different p-o-r-o-u-s structure provides grinding chip clearance NATURALLY—a fact easily noticed by its long, curling chips. The need for dressing is drastically reduced.



2 TO 5 TIMES MORE PRODUCTION PER MAN PER MACHINE

The List of Por-os-way Users Reads Like a Blue Book of American Industry. Included are:

F. C. Atkins & Company • Bell Aircraft • Edward G. Budd Mfg. Co. • Buick Motor Division of General Motors • Kinner Motors, Inc. • Studebaker Corporation • Thompson Aircraft Products • Wadell Engineering Company • Westinghouse Electric • Wright Aeronautical

RADIAC*

POR-OS-WAY*

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A. P. DE SANNO & SON, INC. 430 Wheatland St., Phoenixville, Pa., Since 1893

NEW YORK, PITTSBURGH, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES

Radiac POR-OS-WAY • Radiac PARAFLEX • Radiac Mounted Points and Mounted Wheels

Radiac Internal Grinding Wheels • Radiac Abrasive Cut-Off Machines and Discs

RADIAC* Mounted Points, Mounted Wheels and Internal Grinding Wheels end "guess grinding"

PRESCRIPTION FITTED and CUSTOM COMPOUNDED: Prescription Fitting is our way of prescribing the exact Radiac Mounted Point, Mounted Wheel or Internal Grinding Wheel for your work. Each "prescription" is custom compounded, then filed—so that re-orders can b accurately and quickly duplicated. When yo buy Radiac you get the *right* wheel—every time

COMPARE ALL THESE OTHER ADVANTAGES

RADIAC MOUNTED POINTS AND MOUNTED WHEELS

All wheels and points are dressed and finished ready to use (no finishing by you is required). • All kiln glaze is removed. • All are 100% tested to precision tolerances. • Concentricity is guaranteed. • Special Bakelite cement secures wheel to mandrel. • Radiac Mounted Points and Mounted Wheels are available in tough, regular aluminum oxide (brown) or in special aluminum oxide (white or red bond) for greater friability.

RADIAC INTERNAL GRINDING WHEELS

All wheels are 100% tested to precision tolerances. • Every wheel is a product of pioneers in the development of internal grinding wheels. • Radiac Internal Grinding Wheels are available in tough, regular aluminum oxide (brown); in special aluminum oxide (white or red bond) or a special exclusive "Blue Glass" friable bond which permits an increase in the ratio of cutting grain to bond.

PIONEERS in the development of mounted points, mounted wheels, and internal grinding wheels.

For Fast Stock Removal, Long Life, Cool Cutting—

RADIAC*

Radiac POR-OS-WAY—Radiac PARAFLEX—Radiac Mounted Points and Mounted Wheels—Radiac Internal Grinding Wheels—Radiac Abrasive Cut-Off Machines and Discs—Tempryte Abrasive Products.

A. P. DE SANNO & SON, INC., 430 Wheatland Street, Phoenixville, Penna., Since 1893

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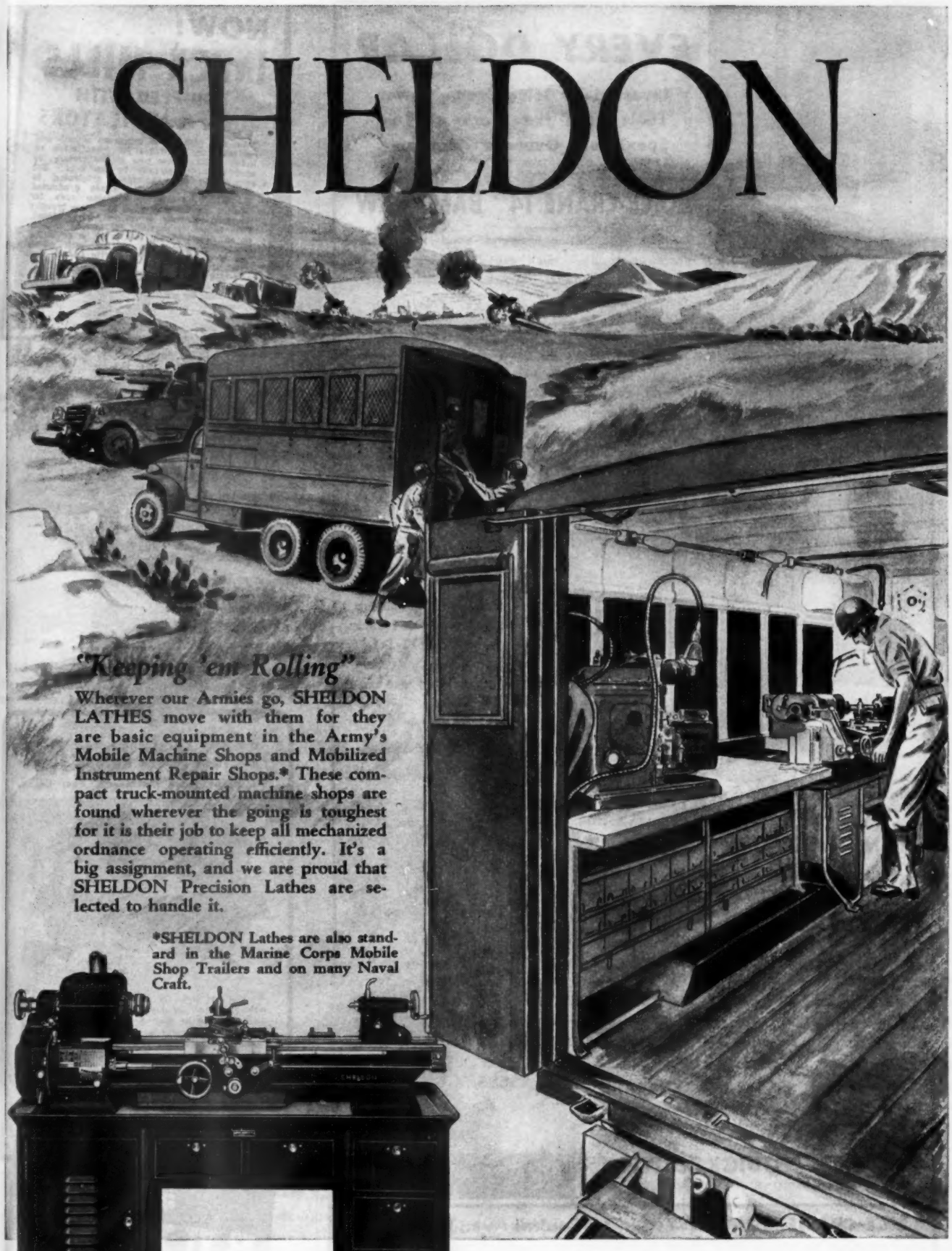
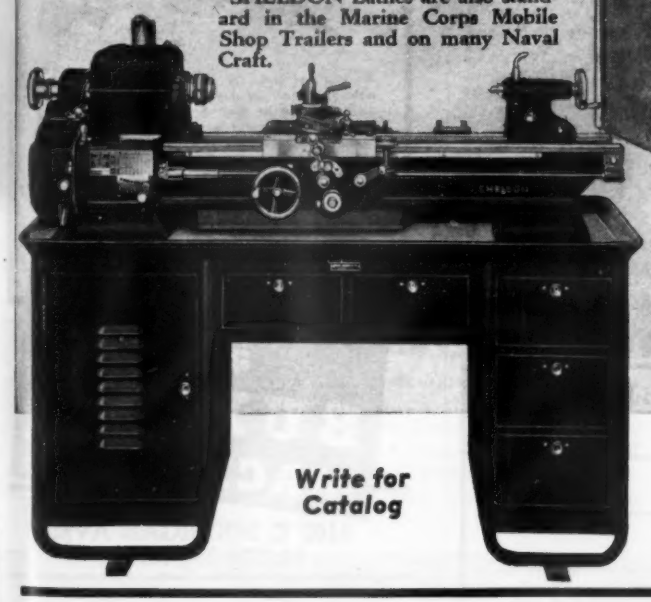
SHELDON



"Keeping 'em Rolling"

Wherever our Armies go, SHELDON LATHES move with them for they are basic equipment in the Army's Mobile Machine Shops and Mobilized Instrument Repair Shops.* These compact truck-mounted machine shops are found wherever the going is toughest for it is their job to keep all mechanized ordnance operating efficiently. It's a big assignment, and we are proud that SHELDON Precision Lathes are selected to handle it.

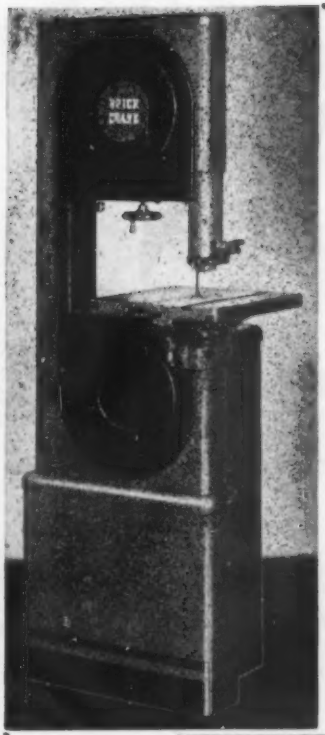
*SHELDON Lathes are also standard in the Marine Corps Mobile Shop Trailers and on many Naval Craft.



Write for Catalog

SHELDON MACHINE CO., INC.

4234 N. KNOX AVE. CHICAGO 41, U.S.A.



EVERY DOLLAR

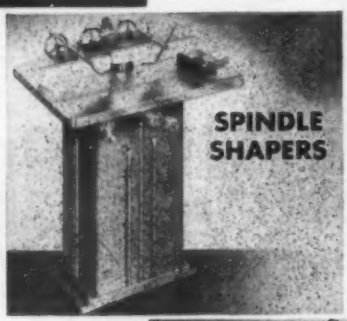
Invested in Boice-Crane Power Tools Does the Work of Two Spent on Oversize Machines.

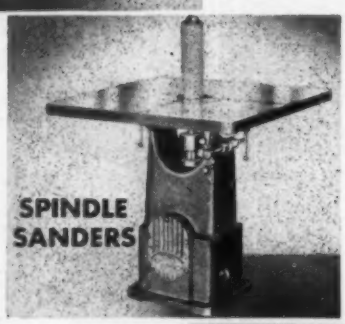
BOICE-CRANE 14" BAND SAW

for fast, free cutting of metal, wood, plastic and paper up to 8⅝" thick and 27" diameter. Fine work reduces sanding costs on end cuts. Quiet. Vibrationless.

The single knob control adjustable guide handles blades from ⅛" to ¾". Top rated by State Safety Commissions. Wheel guard must be closed to operate. Telescoping blade guard held by friction when lock handle is released. Heavy duty gears transmit up to 1 H.P. at lowest speed with full safety. All gears run in oil.

15" x 15½" table tilts 45° to right, 10° to left; convenient scale indicating degree of tilt. Two large trunnions prevent sag under heavy cuts. Single and 8-speed bench and floor models. All moving parts, including motor, on floor models fully enclosed and dust-sealed. A battery of 6 to 10 Boice-Crane Saws costs no more than some single big size machines.





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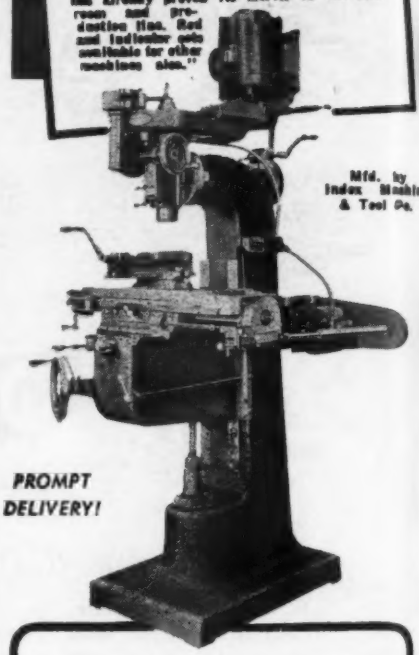
NOW! INDEX MILLS

EQUIPPED WITH RODS & INDICATORS

"We are pleased to announce a rod and indicator set available for installation on Index Mills, either now at the factory, or used machines already in the field. Set consists of two indicators graduated in .001", two micrometer heads graduated .001", accessory precision rods for locating in an arm 8" x 16," and trunnion for holding rods arms and longitudinal. This makes it possible for you to obtain at an astonishingly low price, a precision locator as well as a vertical mill which has already proven its worth in the tool room and production line. Rod and indicator sets available for other machines also."



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12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—simple movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

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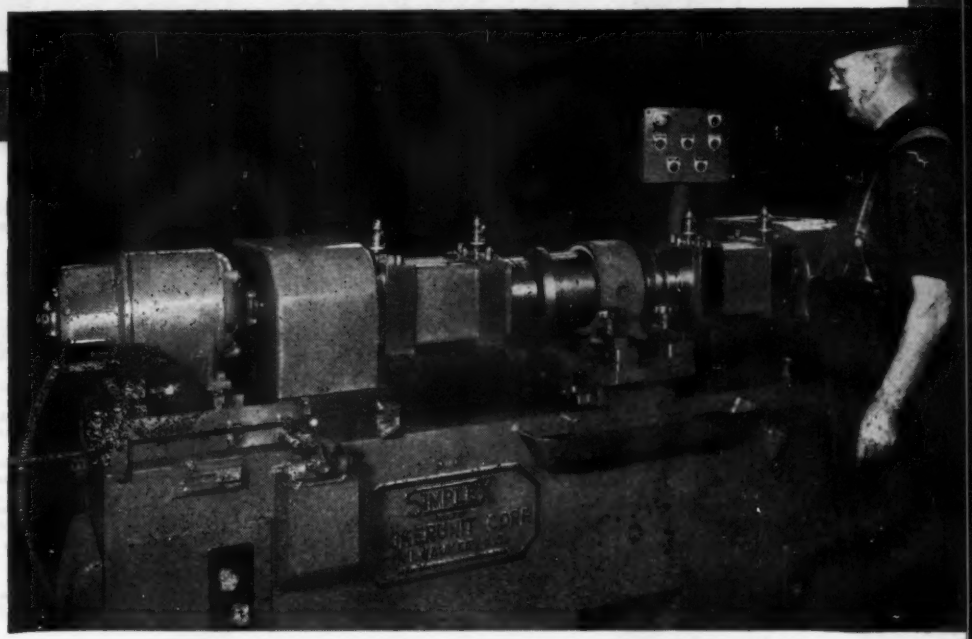
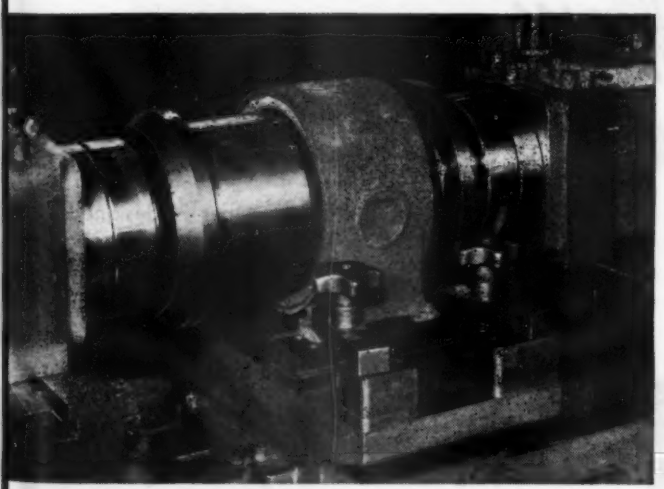
accuracy speed and finish } Combined by a STOKERUNIT SIMPLEX Precision BORING MACHINE

The finished motor stator yoke as it came from the Simplex Precision Boring Machine



Conveniently located push-button controls govern the entire machining cycle of this Simplex 2-U Two-Way Precision Boring Machine

Precision Boring and Facing on Motor Stator Yoke Completed In One Operation With 2-U Two-Way Model



Fixture is built with interchangeable locators for various sizes

Write Today for these two Simplex Booklets which contain complete data and specifications on the entire line of Stokerunit Simplex Precision Boring Machines. For specific recommendations send blueprints of parts together with your production requirements. You are under no obligation.

Boring, facing and counterboring operations on this motor stator yoke were combined by the manufacturer into one operation with a Stokerunit Simplex 2-U Two-Way Precision Boring Machine.

Four tungsten carbide cutting tools, three on the long end, one on the short end, operate simultaneously to complete the three required boring operations at different diameters and depths in a minimum of boring time. Ease and speed in set-up of the part also brought savings in floor-to-floor operations.

In addition to savings in time, the manufacturer obtained high finish and close tolerances on all required bores. All diameters were held well within tolerances of +.002" and −.000". This model is capable of maintaining accuracy to .0002" with excellent finish and is also used for the boring of both larger and smaller stator yokes. Only minor adjustment of the machine and a change in the size of cutting tools used are necessary to adapt the Simplex 2-U Two-Way Model for use in the precision boring of these parts.

Stokerunit Solves Your Boring Problems

Twenty-five versatile models of Stokerunit Simplex Precision Boring Machines are available, covering almost the entire range of precision boring applications. They are furnished with either hydraulic or mechanical feeds, with single or multiple spindles and are adaptable to either short-run or production work. Simplex precision boring machines enable you to obtain accuracy and finish in boring, even with inexperienced operators.

STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES

4524 WEST MITCHELL STREET • MILWAUKEE 14, WISCONSIN

PORTAGE

HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.*

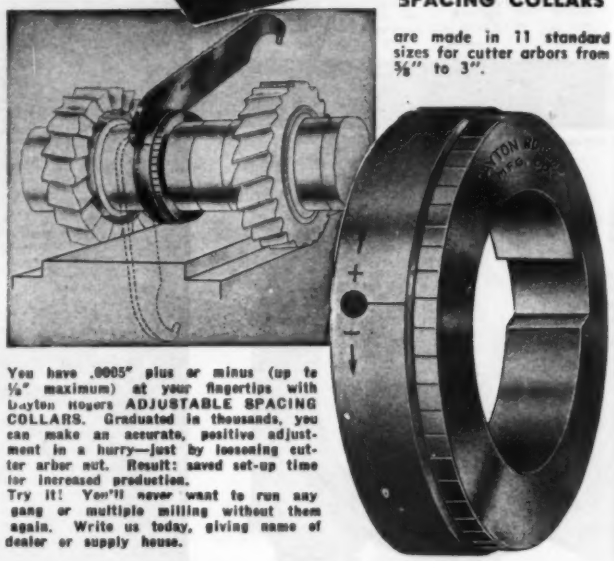
THE PORTAGE MACHINE CO.
AKRON 11, OHIO

FAST, ACCURATE SPACING

for
SIDE MILLING CUTTERS
GANG MILLING SET-UPS

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

are made in 11 standard sizes for cutter arbors from ⅜" to 3".



You have .0005" plus or minus (up to ⅛" maximum) at your fingertips with Dayton Rogers **ADJUSTABLE SPACING COLLARS.** Graduated in thousands, you can make an accurate, positive adjustment in a hurry—just by loosening cutter arbor nut. Result: saved set-up time for increased production.
Try it! You'll never want to run any gang or multiple milling without them again. Write us today, giving name of dealer or supply house.

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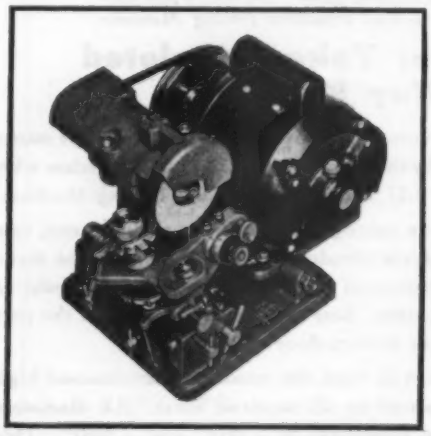
ANNOUNCING THE NEW *Waltham* CUTTER SHARPENER



Available with index plates or pawl locating attachment

The new Waltham Cutter Sharpener is designed to keep cutters in production—to make sharpening a fast, accurate operation to do this easily and economically even with inexperienced labor.

This machine can be used for sharpening cutters such as those used for gear cutting and thread milling, circular form tools, straight fluted hobs, and multiple cutters. These may be sharpened radially or with any desired rake angle. Maximum capacity is 2" diameter and 3/9" thick.

The standard machine is designed to use an index plate for each cutter size. A pawl locating attachment can be furnished for locating on the top relieved portion, or the back of the teeth if desired.

The Waltham Cutter Sharpener is complete—put it on any handy bench—plug into a 110-volt line—it's ready to go, and ready to sharpen cutters for maximum efficiency. Complete information will be found in a new, illustrated catalog—*send coupon for your free copy today!*

EDWARD BLAKE CO.
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NEWTON CENTRE 59, MASS.

Please send me new folder giving full details on the Waltham Cutter Sharpener.

Name ..... Title .....

Company .....

Street .....

City ..... State .....

A.M.

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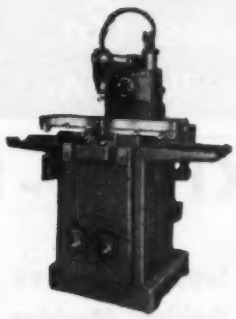
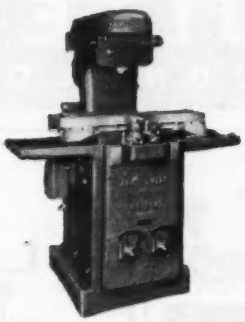
KENT-OWENS
for Milling Machines

Rugged...
Simple...
Efficient...

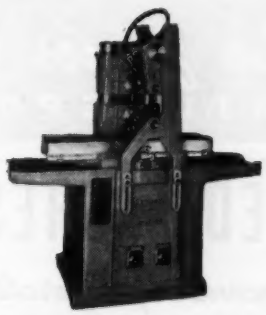
No. 2-20...20" table travel...42" x 12" table...full automatic hydraulic table feed.



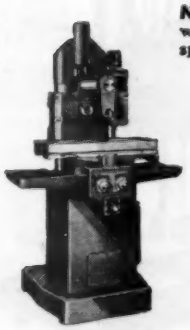
No. 1-14...32" x 9" table.. 14" table travel...hydraulic table feed...full automatic cycle.



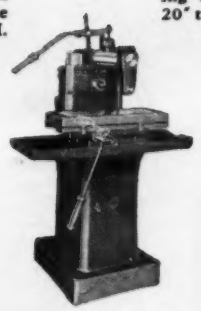
No. 1-14V... 14" table travel with full automatic cycle...spindle speed range 115 to 3000 R.P.M.



No. 2-20DS...Double Spindle Machine for performing two milling operations at same time... 20" table travel...42" x 12" table.



No. 1-V...Hydraulic vertical head feed...5½" head travel...25" x 9" table.



No. 1-M...Hand feed to table and head...25" x 9" table...1 H.P.... head counterbalance is adjustable.

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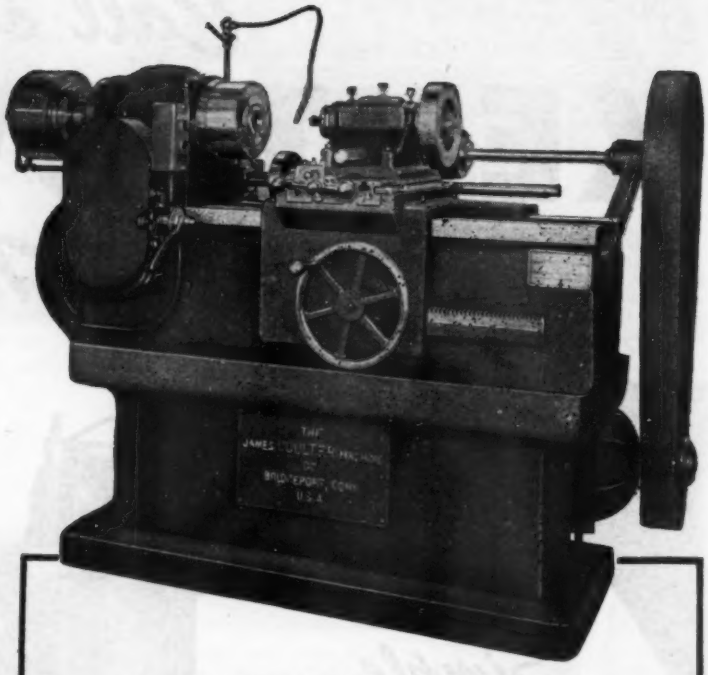
KENT-OWENS MACHINE CO., TOLEDO, OHIO

Keep Ahead of
DEFENSE DEMANDS
on the PRODUCTION of
EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

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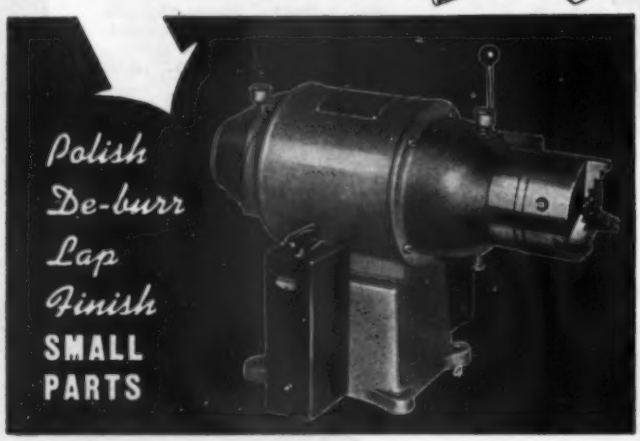
SPEED LATHES
for Secondary Operations



Schauer Ideal Speed Lathes insure finer quality, greater accuracy and uniformity, coupled with increased output and lower cost. A size and type for every finishing purpose. State YOUR finishing problem. Write for Catalog 460.

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ORIGINATORS OF TODAY'S SPEED LATHES
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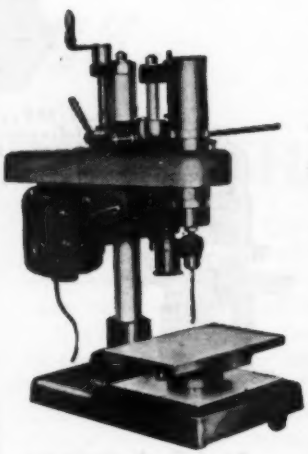

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- **BETTER DRILLING**

Super Sensitive Drilling Machine

• Designed and built for accurately drilling small holes .004" to .250" diameter. It consists of a self-contained drilling unit which swings radially on the column and may be locked in any desired position.

Here's an exceptionally flexible small drilling machine which is easy to operate and may be ganged for sequence operations or to obtain greater production.

Another distinct advantage is the full floating spindle of special design which eliminates radial belt pull on the spindle.

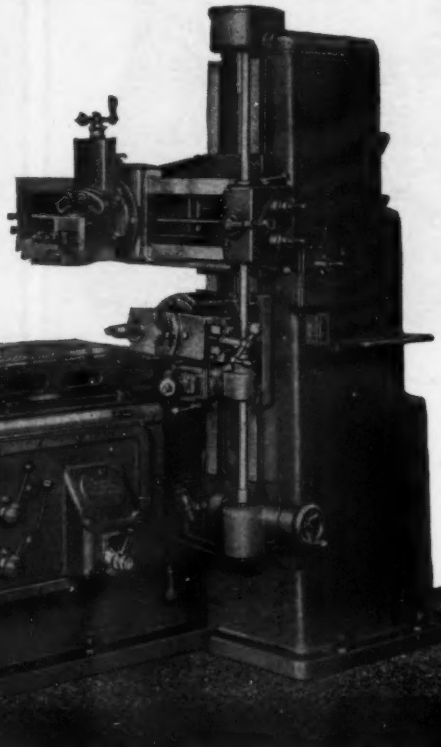
Distance from center of chuck to column, 5 inches. Vertical work capacity from base to chuck, 10 inches. Spindle speeds from 750 to 12,000 R.P.M. Write for full descriptive bulletin.

The Hamilton Tool Co.
830 NINTH ST HAMILTON, OHIO

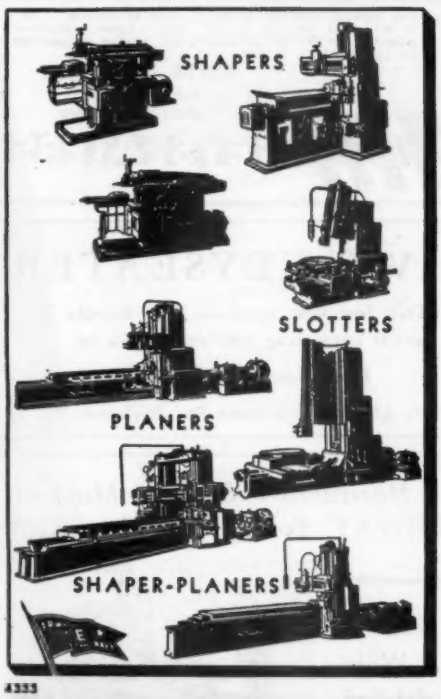
36" OPENSIDE

Hy-Draulic

SHAPER



HAS THE EXACT SPEEDS AND FEEDS YOU NEED FOR THAT WORK YOU WANT TO DO FAST



4333

● The 36" Openside Hy-Draulic Shaper has many unusual advantages. Its hydraulic drives give unlimited numbers of cutting speeds and feeds in specified ranges. Operators quickly get the *exact* combination of speed and feed for maximum production on each job. It is so simple and easy! Almost anybody . . . including blondes, brunettes, and redheads . . . can produce a whale of a lot of work with the 36" Hy-Draulic Shaper and finish every shift feeling fine.

This Hy-Draulic Shaper has power, speed and lasting accuracy to handle easily those big jobs that make ram-type shapers grunt. Its box-section table reciprocates, planer-fashion, on a deep extra-long bed; supports work-pieces solidly. There is no ram with long overhang, no leverage to accelerate wear on ways; no main-drive clutch to adjust or reface. Overhead tool is carried on rigid rail that has powerful clamping to column, enormously strong rear member. Openside construction and available side-head are notable advantages. The 36" Openside Hy-Draulic Shaper can take seven-day, three-shift running for years of "duration", and then some. It's "tops" for high quality and output. Investigate! Write today for Bulletin 1109.

Hy-Draulic

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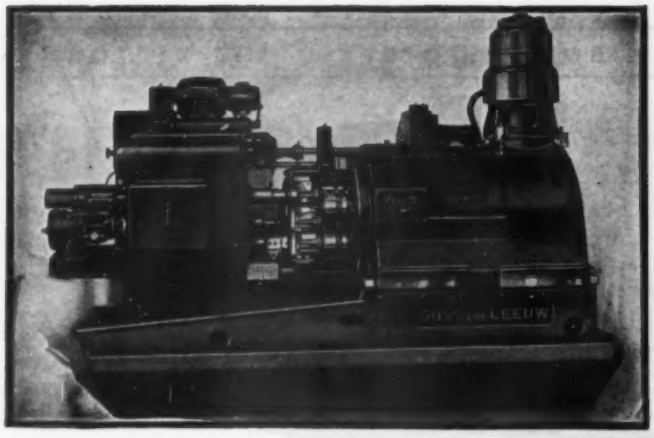

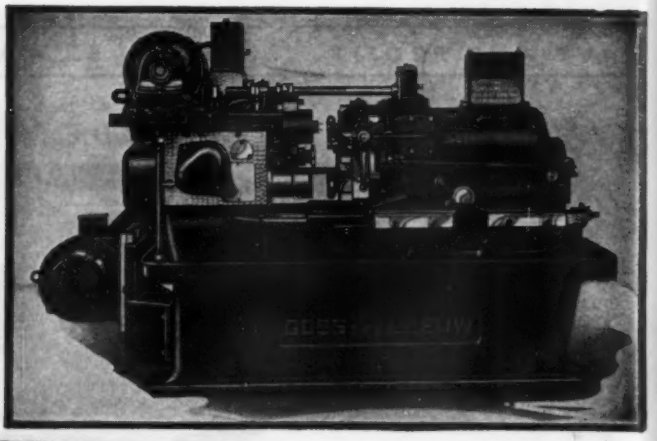

WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

DOUGLAS PRECISION MILLER

for Toolroom and Production

Size 32" x 8" Plain

THE PRECISION BUILT INTO THE DOUGLAS MILLER

provides efficiency and speed to produce small parts requiring the extreme accuracy essential for war production.

Rigid well balanced design, combined with central control make for easy operation, permits the release of highly skilled labor for other tasks.

A wide selection of speeds meets all requirements for toolroom and production.

There is an ample variety of feeds from which to choose the right feed for material and accuracy requirements.

Timken bearings and helical drive gears are other features to assure a smooth performance. Write today for specifications and prices.

PROMPT DELIVERY

DOUGLAS MACHINERY CO., Inc.
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For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

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DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

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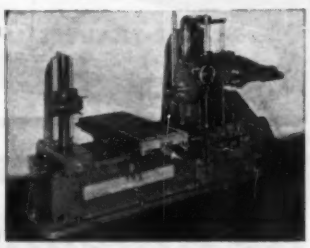
UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

GORTON

SPECIALISTS FOR OVER 50 YEARS IN

Tracer-Controlled MILLING

How Tracer-Control SAVED 180 HOURS ON THIS PLASTIC MOLD WAR JOB

(Above) The taper, which could not successfully be generated by any other production method. Finished molded cone shown 1/4 size.

ONLY THE GORTON DUPLICATOR could solve this Massachusetts manufacturer's problem on the production of molds for tapered cones. Other production methods caused an unevenness of the cut which could not be polished out.

The Gorton Duplicator was equipped with a power-driven rotary table. A simple template, held in a vise, was used as a master. TRACER CONTROL—the tracer moving along this template—guided the special cutter having a taper identical to that of the cone.

The floor-to-floor time for roughing by previous methods was 11 hours. The Gorton Duplicator cut this time to 2 hours—a saving of 180 hours on the roughing of 20 molds—and produced an extremely fine finish. Both roughing and finishing operations were done on the Gorton Duplicator.

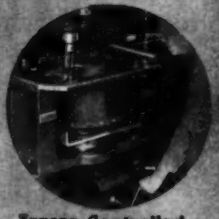
PRODUCTION DATA

Material—Tool Steel.
Operation—Duplicating Molds.
Feed—Manual.
Speed—Roughing 750 r.p.m. Finishing 3600 r.p.m.
Time, Floor-to-Floor—Roughing 2 hours—Finishing 1 hour.

Use Gorton Free Engineering Service

Gorton Engineers invite you to submit any problem to be solved. For more than 50 years, Gorton Engineers have constantly added to a wealth of machining information in our performance record files. These records often contain the solution to a problem similar to yours. Submit prints or specifications through your nearest Gorton dealer, or direct to the Gorton factory at Racine, Wisconsin. There is no obligation.

The *Right* Size The *Right* Type of Machine for Every Job . . .
From 2 oz. to 2 ton DIE BLOCKS



Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING

Tracer-Controlled ETCHING

GORTON ARMY E NAVY

GORTON *Precision* MACHINES

CUTTER GRINDERS · ETCHING MACHINES · 2 & 3 Dimensional PANTOGRAPHS · Vertical & Universal Hand Super-Speed MILLERS · Manual & Electric Control DUPLICATORS

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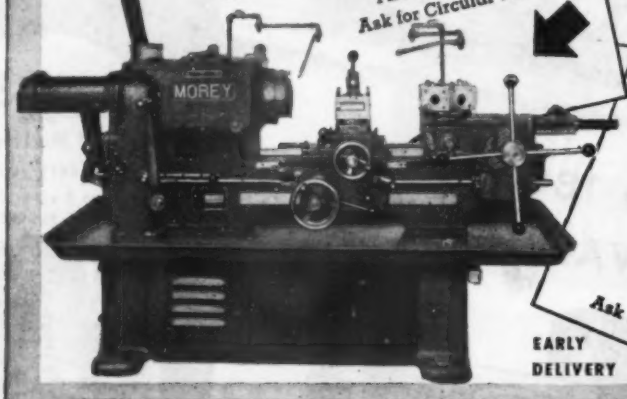
MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A



2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL

For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
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- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR NOISES (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS *MODERN* TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE KIND WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!

These small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

Complete Information Will Be Sent You Upon Request — Write!

BURKE MACHINE TOOL CO.
CONNEAUT · · · OHIO

INVESTIGATE Tannewitz DI-SAWS

and You'll Want No Other!

Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS. Sturdier, heavier construction throughout, plus many refinements of design, make these machines the greatest trouble-free producers in their field. It pays to buy the best!

With a TANNEWITZ DI-SAW you can do in minutes jobs which require hours by the shaper, miller or lathe methods; and there are models to accommodate work of practically any size. Get the facts. Write for "DI-SAW Bulletin".

STANDARD MODEL No. M24 (24" WHEELS)

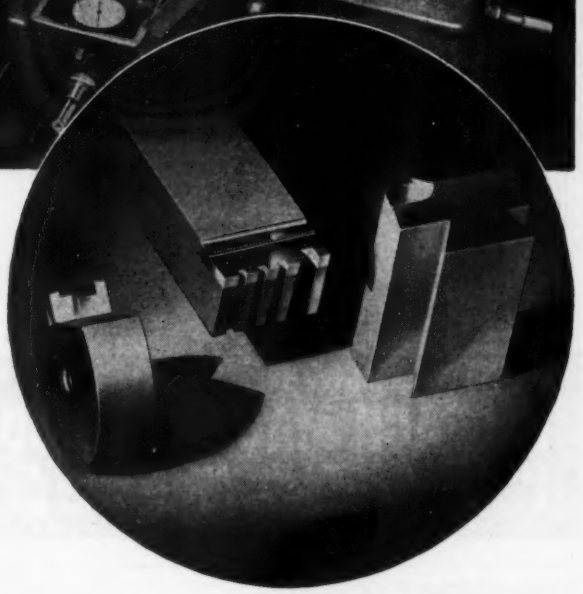
Other Bulletins Worth Sending For:
"SINGLE AND VARIABLE SPEED BAND SAWS FOR FOUNDRY USE", "SHEET METAL CUTTING BAND SAWS". Just a line will bring them promptly.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH

THESE Wickman PRINCIPLES

LAYOUT 50 TIMES THE SIZE OF PROFILE TO BE GROUND
50 TO 1 PANTOGRAPH
30 POWER MICROSCOPE
CROSS HAIRS OF MICROSCOPE FOCUS ON WORK AND GRINDING WHEEL. INTERSECTION OF CROSS HAIRS CORRESPOND TO THE POSITION OF THE POINTER ON 50 TIMES SIZE LAYOUT.

Make Possible The ACCURATE GRINDING Of Profiles Such As These In Tungsten-Carbide Or Other Hard Metals



● The Wickman Profile Grinder has for a number of years proved exceptionally efficient for the grinding of irregular shaped contours on flat or circular form tools, male and female profile gages, punches, open and sectional die segments, etc.

● Accuracy is held to within ± .0005". This accuracy is not affected by wheel wear and no special shapes or radius dresser need be used.

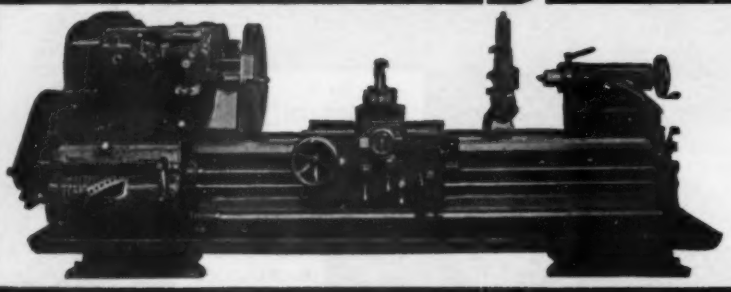
● Finished parts can be checked against the layout without removal from the machine: Reversing the operations followed in grinding, layouts can be made of parts having previously undetermined profiles.

Literature Containing Full Information Is Yours for the Asking

THE Wickman CORPORATION

15539 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN

SPRINGFIELD GEARED HEAD LATHES



for peacetime or war production!

A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes—flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.

M M

LEACH External Grinder

Price reduction made possible by increased production.

PRICE

~~$985.00~~

$875.00

Fully Equipped

Our dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

Grinds Work from ¾" to 11" in length and from ⅛" to 7" in diameter.

Send for Descriptive Literature

EXCELLENT DELIVERIES

Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.

Agents in all Principal Cities Throughout the World

MILLING and JIG BORING at HIGH SPEEDS

Every minute of toolmakers' time counts, so why waste it on over-capacity machines when the compact, sturdy little LINLEY so easily handles the fussy hurry-up jobs so often required.

Built for accuracy at high speeds, the LINLEY can be relied upon for precision machining of such jobs as

DIE WORK, JIG AND MODEL MAKING, METAL PATTERNS, DRILLING AND REAMING

Choice of 8 spindle speeds—275 to 4250 r.p.m., micrometer screw "velvet" feed, counterbalance to remove quill backlash, precision ball bearings—no spindle strain, ample table size (7" x 17½"), plenty of clearance, fast set-up, quick and easy changeover . . . all the features for profitable operation in a busy shop. Floor space only 18½" x 20".

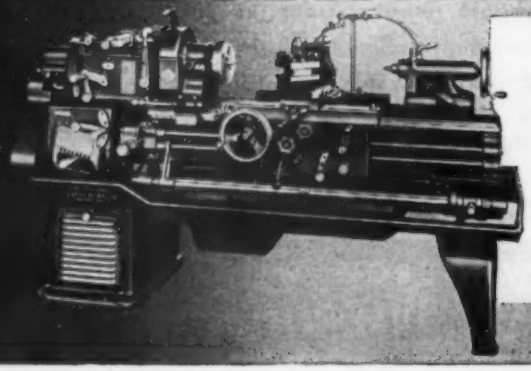
Send for illustrated bulletin today.

LINLEY BROTHERS COMPANY

664 STATE ST. EXTENSION

BRIDGEPORT 1, CONN.

CINNATI LATHES

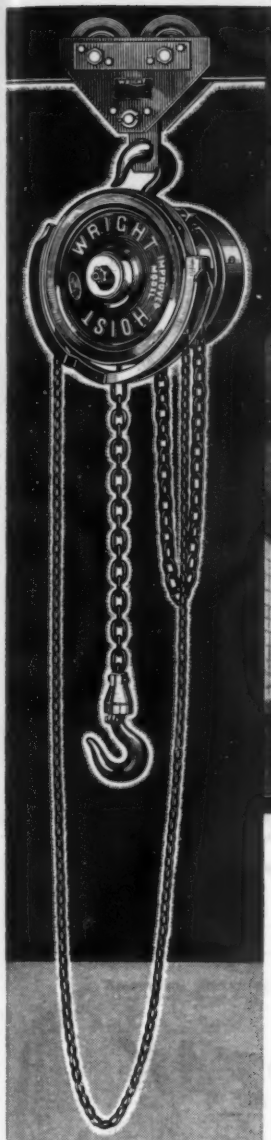


Inherently accurate on every job

In every detail of design and construction, accuracy of these modern, convenient lathes assures precision performance. For example: gears are cut to closest tolerance, hardened and ground; spindle is mounted on roller bearings taking thrust in both directions; ways and carriage are hand scraped to closest precision. A massive bed construction provides strength and stiffness which contribute to overall accuracy on heavy cuts. Made is sizes from 14" to 30" inclusive. Send for detailed specifications.

THE CINCINNATI LATHE & TOOL CO.

Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio



Wright

makes your ceiling your freight clearing yard . . .

For routing and distributing materials, **WRIGHT** Hoists and Cranes convert your plant ceiling into a clearing yard—where vertical and horizontal material-handling takes place speedily, safely and economically. **WRIGHT** Improved High Speed Hoists, **WRIGHT** *Speedway* Electric Hoists and **WRIGHT** Cranes turn idle ceilings into busy, productive areas and save time and money.

Whatever your handling problem may be, **WRIGHT** engineers and distributors are qualified and capable to give you helpful assistance. Look under "**HOISTS**" in your classified telephone directory for the name of your local **WRIGHT** distributor. He is a good man to consult about better material-handling methods in your plant.

WRIGHT MANUFACTURING DIVISION
York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT · CONNECTICUT

ARMY E NAVY
FLYING OVER THE WRIGHT HOIST PLANT

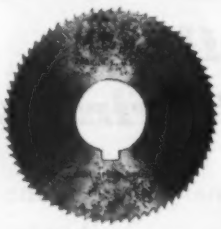
ACCO
In Business for Your Safety

WRIGHT
Improved
High Speed
HOISTS

CIRCLE ®

SCREW SLOTTING SAWS

2¼" diameter


2¾" diameter

1¾" diameter

Used by most of America's larger screw manufacturers, these Circle R saws are made of selected high speed steel. Like all Circular Metal Cutting Tools they are designed by specialists to successfully accomplish the most exacting operations.

Complete stocks of these sizes are available.

★

For detailed information on these and other Circular Saws send for Catalog K. NOW!

CIRCULAR TOOL CO., INC.
PROVIDENCE 5, R. I.
CHICAGO · PHILADELPHIA · NEW YORK · DAYTON
LOS ANGELES · ROCHESTER · INDIANAPOLIS · DETROIT
CLEVELAND · ST. LOUIS

Grand Rapids

DRILL AND TAP GRINDERS

Model 10-B

Other Combinations Also Available

Sharpens Taps, 2, 3 and 4 Flute, Right or Left Hand. Sizes No. 6 to one and one half inches.

Sharpens Drills, 2 and 3 Flute, Straight or Taper Shank. Sizes from one eighth to one and one half inches.

GALLMEYER & LIVINGSTON CO.
330 Straight Ave. S.W.
GRAND RAPIDS (47) MICH.

BREAK THAT MARKING BOTTLENECK

Now there's no time to waste. Production bottlenecks are taboo and unnecessary — especially when it comes to marking. Noblewest rapid precision marking equipment keeps pace with today's vital demands. Users report up to 500% increases. Tell us what you want to mark and we will make time- and money-saving recommendations.

NOBLE & WESTBROOK MANUFACTURING CO.
Marking Specialists Since 1904
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Completeness. Model 98, which marks not only the trademark but also other important information. And all with phenomenal speed.

MARK IT BEST WITH NOBLEWEST®

For PRODUCTION PLUS ACCURACY USE MODERN

Stationary Type, Self-Opening Die Heads

CHECK THESE FEATURES

- √ **Least number of parts.**
- √ **Simplest construction.**
- √ **Hardened and ground throughout.**
- √ **Cut close to shoulder threads without special chasers.**
- √ **Easily adjusted for thread size.**

These die heads have many features that ideally adapt them to high speed, accurate production runs. They have a minimum number of parts which reduces wear and insures long life. All parts are of hardened steel, accurately ground for close tolerance work.

Positive in opening and easily adjusted to any thread cutting operation within their capacity, these die heads are perfect for use in a stationary position on hand screw machines, turret lathes and other machines.

Style T Die Heads are made in capacities from ⅛" to 2". Style B may be had in capacities from 2½" to 7". For more information send for Bulletin M-123.

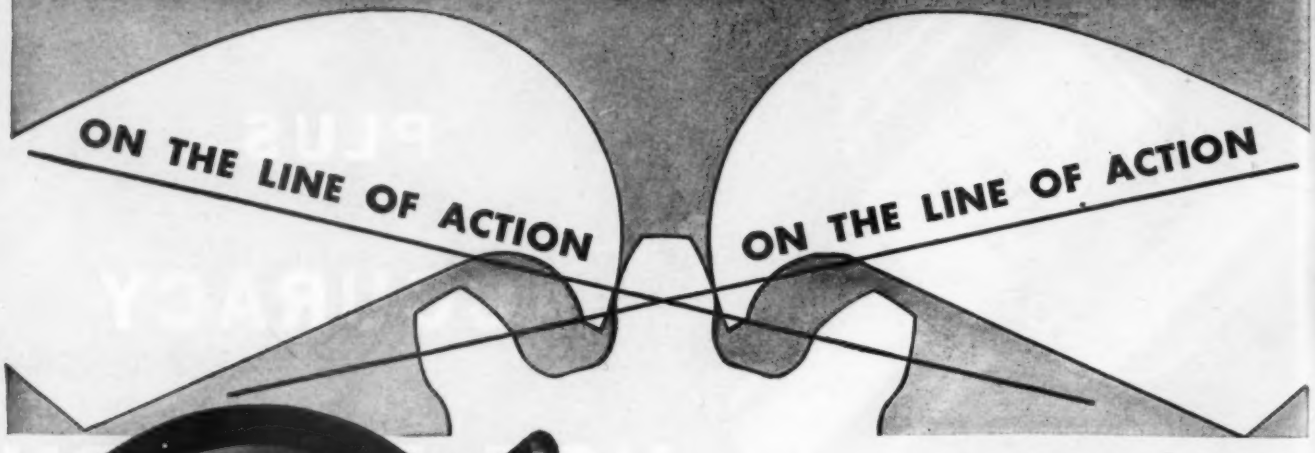
MODERN TOOL WORKS

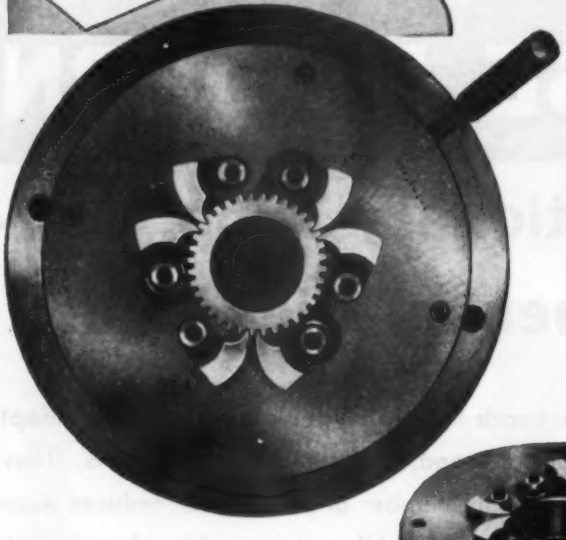
DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK

To Hold Gears *with precision*

FOR BORING OR GRINDING

HAVE TEETH GRIPPED THIS WAY





Method eliminates distortion. Gripping action distributed around circumference rather than through diameter. Principle used only in

MATCH-IT GEAR CHUCKS

For grinding the hole, the hub face, or for boring most delicately constructed gears within your tolerances in relation to pitch diameter. Distance from root diameter to the hole or counterbore of any gear never presents a problem, as pressure is always against the sides of teeth, never toward the center along diameter to cause distortion.

MATCH-IT GEAR CHUCKS are made for internal and external gears, spur and helical gears, and countershaft type gears.

***All* your gears can have perfect, round holes. If your production gives you too many scrapped gears, perhaps your chucking can be improved. Our engineers can help you deliver a higher percentage of perfect gears.**

We believe no other chuck will produce as accurate results.

BUY WAR BONDS

LeMaire TOOL & MFG. CO.

2665 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Facilitates Production Saves Millions

Delta Machine Tools

Use of these portable machines for heavy-duty production was a pre-war discovery... adopted in almost every branch of industry to meet the war crisis... and now an integral part of American manufacturing methods for the post-war era.

Here's how you facilitate production

Portability — Delta machines can be moved instantly to any place in the shop or production line.

Flexibility — Revise layouts at will, to get best sequence of operations and break bottlenecks.

Adaptability—Small and compact, Delta machines can be added to present layouts to save waiting, to provide extra operations during idle time on automatic machines, etc.

Special-Purpose Machines — Use them freely — when you can build them so quickly at such little cost, out of standard Delta elements.

Here's how you save a lot of money

Low First Cost—Frequently, Delta tools to do a given job cost a fraction as much as older, heavier types.

Low Fixed Charges — Because of limited investment and long life, Delta equipment holds down your fixed overhead.

Lower Power Cost — These newer tools, employing smaller motors, often cut power cost 30% to 60%.

Low Labor Cost — Savings up to 80%. Minimum training problems.

Low Maintenance Cost — Practically no upkeep. Delta quality shows up in the grind of steady production.

Here's your assurance of dependability and durability

Quantity Production — Delta cost savings are due to modern production methods applied to a large volume of standard models — not to short-cuts in quality.

Latest Production Equipment — The finest available, to assure consistent accuracy. Rotating parts *dynamically balanced.* Ball bearings *pre-loaded* to precision limits. All spindles, arbors, etc. *precision-ground* to finished sizes. Ball-bearing seats, etc. *diamond-bored.* Flat surfaces *precision-ground.*

... and here are the machines themselves ***TURN THE PAGE***

New economies inhi

. . . with low-cost, dependable De

Delta Power-Feed Drill Presses

Worm-driven power feed operates directly off motor — giving *8 rates of feed for each spindle speed.* One swift hand motion brings drill down to work. Automatic stop and spindle return. *Instant* switching from heavy power-feed operations to sensitive hand drilling. 17-inch single spindle drill presses available in 24 different models.

Delta Floor-Type Multiple-Spindle Drill Presses

4-spindle model illustrated. 2-spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle.

Delta 6" Abrasive Belt Finishing Machine gives you top efficiency

Handles dozens of sanding, polishing, and finishing operations — polishing and sizing metal parts, finishing and polishing die castings, finishing, finning and surfacing plastic parts, etc. Set horizontally with wood fence for edge or face sanding, or used vertically in connection with the 7½ x 14¾" tilting table. Completely equipped with double-seal ball bearings. Many other quality features.

Delta 14" Metal-Cutting Band Saw

This low-cost, high-quality machine cuts anything from carbon steel to asbestos — has dozens of uses in the general tool and machine shop, also the pattern shop (4 metal-cutting speeds, 1 wood-cutting speed). Delta features: *10 New Departure Self-sealed ball bearings* carry all wheels and shafts. *Heavy table,* 14" x 14", swings smoothly. *Simple, foolproof gear drive. Guides* give micrometer accuracy with independent adjustments. *Safety features* complete, meet all requirements.

Delta Cut-Off Machine eliminates expensive finishing

Cuts plastics, non-ferrous metals, etc. to exact length with polished smoothness; polishing and burring usually unnecessary. (Also convertible to abrasive cutting of steel.)

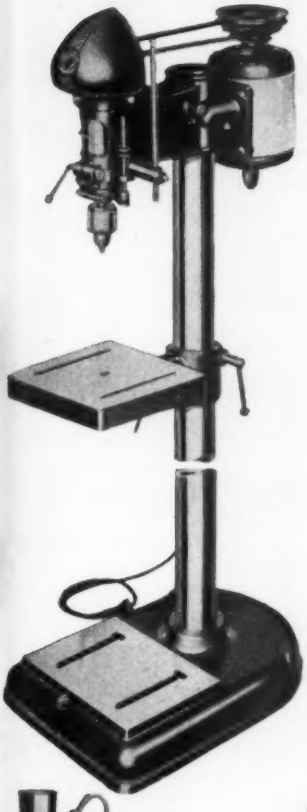
DELTA-MILWAUKEE . . *pioneers of small, compact*

in high-production tooling
ole Delta Machine Tools

Spindle

2-spindle
one-piece
l tables:

Cut-Off
finishing
to exact
shing and
onvertible



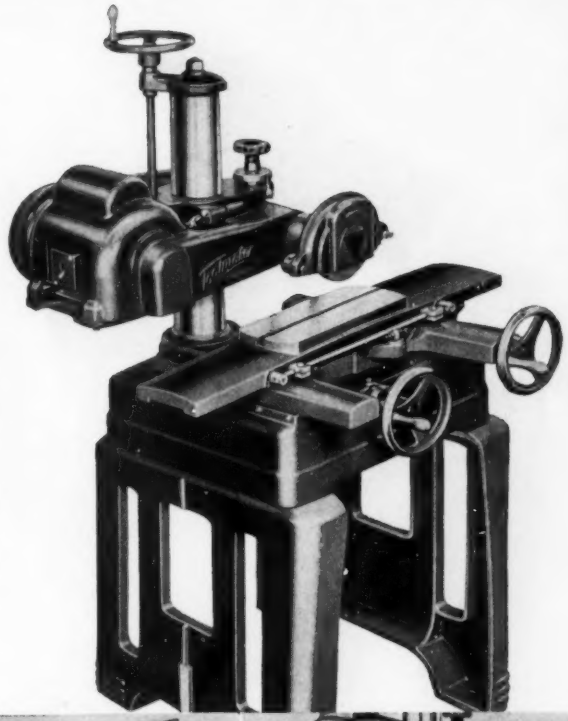
Delta 14" Floor-Type Drill Press

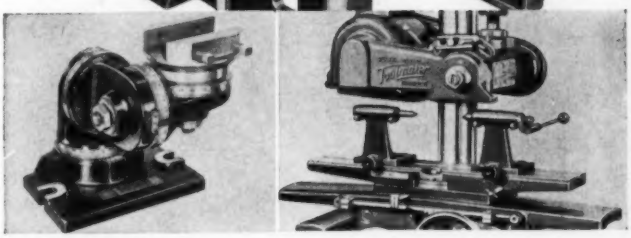
Delta's patented construction provides *both* a self-aligning drive and a free-floating spindle. Many outstanding features, including smooth-working table-raising mechanism, built-in depth gauge, streamlined safety belt guard, quill with 5" stroke or travel, etc.

Delta Toolmaker Surface Grinder gives dependable, trouble-free results

This husky, big-capacity grinder is a "heck of a lot of machine for the money," say delighted users. Ideal for surface grinding, tool sharpening, etc.

Designed for ease and speed of operation. Convenient controls . . . wide graduations on micrometer for close settings . . . unique wheel-adapter that saves time on truing-up operations . . . many other features that assure you creditable performance. 7 x ½" wheel, 1¼" bore.





With the Univise, the first truly universal vise for grinding, drilling, and milling, this machine serves as a dependable, accurate Chip-Breaker Grinder for grinding the chip-breaker groove on carbide-tipped tools. Holds the tool at any conceivable angle — accurately reset at a moment's notice.

With the Unihead, it becomes the latest development in Tool and Cutter grinding. Simple, accurate, and very low in cost. Delta construction features assure perfect alignment and freedom from play. Substantially built and machined to very close tolerances. Table surface 5¾ x 13".

Delta Carbide Tool Grinder Runs True

ree from vibration, for deli-te grinding of carbide-tipped ols. Combined with the elta standard tool grinder e hogging down the shank eel, it gives you a perfect orking combination for arpening tungsten carbide ols, with a remarkably small itial investment.

Delta Grinder with Twin-Lite Shields

gives you extra convenience, efficiency, safety.

Twin-Lite Safety Shields act as "built-in goggles," flooding the work with light. Tool rests fully machined. Wheels balanced to 1/100 inch ounce. Precision double-sealed New Departure ball bearings, lubricated for life. Heavy, rigid base.

DELTA
MILWAUKEE
Machine Tools

SEND FOR CATALOG
— coupon on next page

npact durable low-cost machines for heavy-duty production work .

DELTA
MILWAUKEE
Machine Tools

save time and money

— with high-production, low-cost special-purpose machines built from standard Delta Units . . .

Ingenious combinations of low-cost stock-model Delta tools — devised by production men in America's leading war plants — have written a new chapter in modern tooling practice. ● Special-purpose machines, increasing production 200% to 600%, have been built at a fraction of the cost and in a fraction of the time ordinarily involved. This minimum capital investment, moreover, is flexible—being composed chiefly of standard elements which are readily convertible. ● This new free book pictures and describes a wide range of applications — actual, detailed case histories which give your production men a running start on your own special problems. Break your war-production bottlenecks — plan for an edge in post-war competition — with these modern methods. Write for free copy of the Blue Book.

M-9

140 examples from War Production — in Delta's new 76-page Blue Book

THE DELTA MANUFACTURING CO.
609D E. Vienna Ave., Milwaukee 1, Wis.

Please send my free copy of your new 76-page Blue Book, and catalog of low-cost Delta tools.

Name.....Position.....

Company.....

Address.....

City.....(.....) State.....

Tear Out and Mail the Coupon..

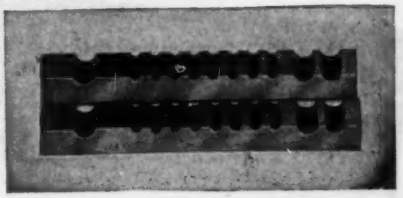
Send today for your free copies of these valuable books. Consult your Delta-Milwaukee distributor regarding priorities and deliveries (most Delta machines are available on automatic priorities under MRO).

DRESSING IS SIMPLIFIED . . . *by the New Time-Saving* C-66 . . . RADIUS DRESSER FOR SURFACE GRINDERS

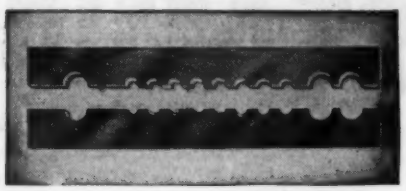
This low-priced, rugged attachment, for any make of surface grinder, dresses wheel without dismantling machine. Mounts directly on magnetic chuck. Does a one-hour job in 10 minutes — accurately — conveniently.

NOTE how this Radius Dresser and two High Speed Tool bits replace an expensive Jig Boring Machine.

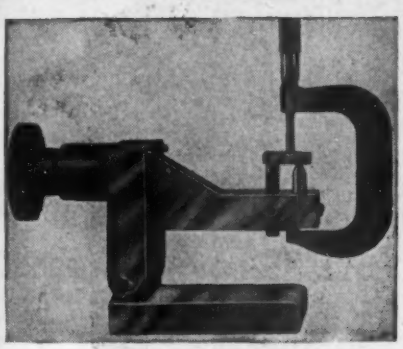
Drill Jig made with two high speed tool bits ground together on surface grinder, eight .062 holes, two screw holes, one dowel pin-hole. No drill bushings, no lapping, no hardening. Grinding time two hours fifteen minutes. Simple, easy, quick.



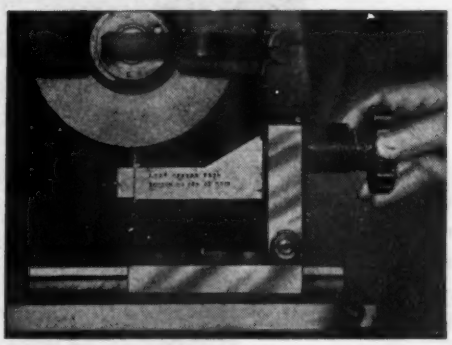
Two High Speed Tool Bits ground for drill jig.



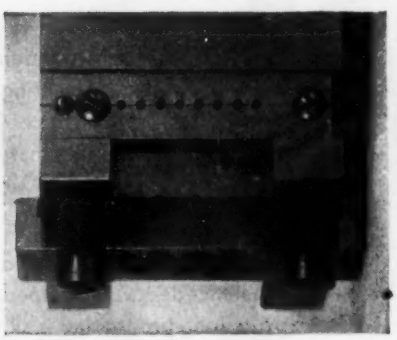
Drill jig completely assembled.



The diamond is set by simply measuring with micrometer from top of hood to bottom of arm.



The C-66 provides an important safety feature in that hands are kept away from under the wheel.

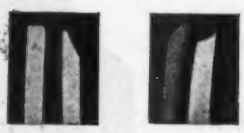


Drill jig completely assembled.

For dressing wheels for grinding turning tools, the dresser is set at angle equal to clearance angle of tools. The C-66 is the only radius dresser with this feature.

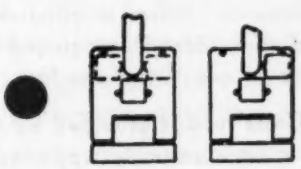
Long Wearing Chisel Point Diamond

The diamond holder is held against a ground vee in the arm. By means of this construction any size diamond up to 3/8" can be held accurately in line with the vertical center line of spindle.



.013 Male and Female Radius

.500 Male and Female Radius



180° and 90° Male Dressing.

Prompt delivery from factory in Newark, N. J. Price, without diamond, $82.50, 1/4 K diamond, $5.00.

SCHULTZ & ANDERSON CO.

MACHINE TOOLS

109 C EDISON PLACE NEWARK, N. J.

BOYAR-SCHULTZ
NEW 618 SURFACE GRINDER

TOOL ROOM PRECISION

WITH HEAVY DUTY
STAMINA

Designed to meet the demands for precision in the most exacting tool and gage work, this new Surface Grinder is engineered to maintain that high degree of accuracy for long, continuous use, even in heavy work.

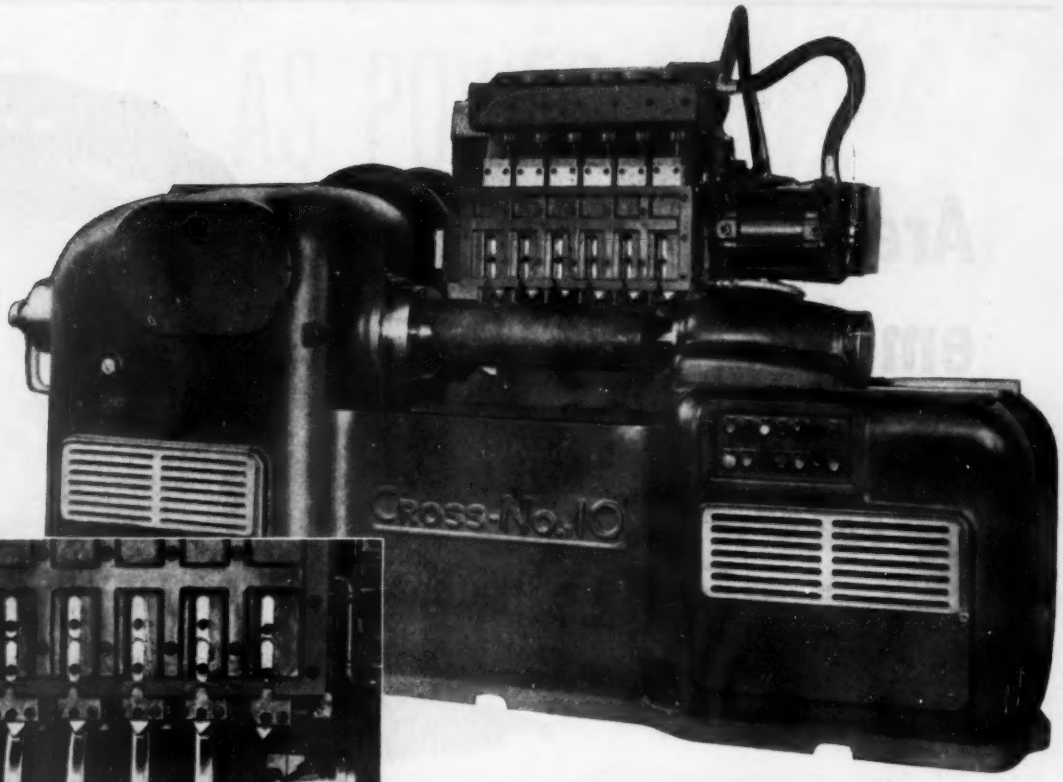
Spindle is specially designed, dynamically balanced and equipped with super-precision, pre-loaded ball bearings; operates at 3,000 R. P. M. smoothly and quietly.

Table of seasoned, close-grained Meehanite moves longitudinally only, and on hardened and ground tool steel ways — one V and one Flat.

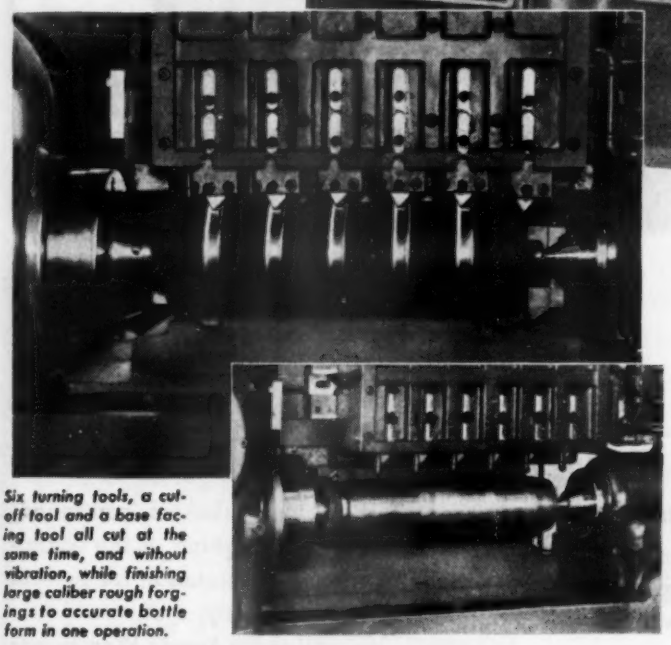
Cross feed is provided by the Vertical column assembly supported by horizontal tubular steel ways, ground and lapped to perfect fit. Wheel moves in a true plane across work assuring long sustained accuracy.

Write for circular describing this new smooth-running, easy handling machine tool.

BOYAR-SCHULTZ
CORPORATION
2109 WALNUT STREET · CHICAGO 12, ILL.



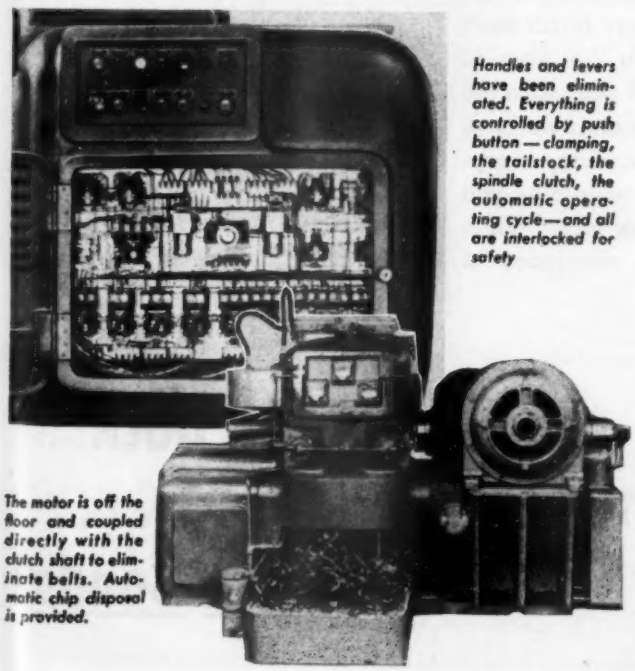
The overhead tool carriage is constructed to provide the tools with rigid support close to the cutting edge. Uniform cutting pressure is maintained with a smooth, powerful hydraulic feed. Chips fall clear of the work and allow a free cutting action.



Six turning tools, a cut-off tool and a base facing tool all cut at the same time, and without vibration, while finishing large caliber rough forgings to accurate bottle form in one operation.

CROSS *Shell* LATHE

Cross Shell Lathes are noted for their productive capacity, durability and ease of operation. They are built to take the fullest advantage of multiple carbide tooling with an automatic operating cycle and ample capacity for handling up to 100 horsepower. The merit of their original design and the quality of their construction are reflected in the performance records of the leading shell shops at home and abroad.



Handles and levers have been eliminated. Everything is controlled by push button — clamping, the tailstock, the spindle clutch, the automatic operating cycle — and all are interlocked for safety

The motor is off the floor and coupled directly with the clutch shaft to eliminate belts. Automatic chip disposal is provided.

THE CROSS COMPANY

Established in 1898

DETROIT, MICHIGAN U·S·A

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come.

WAR BONDS to Have and to Hold.

AMERICAN MACHINIST

★ Let's All Back
★ the Attack...
★ with War Bonds!

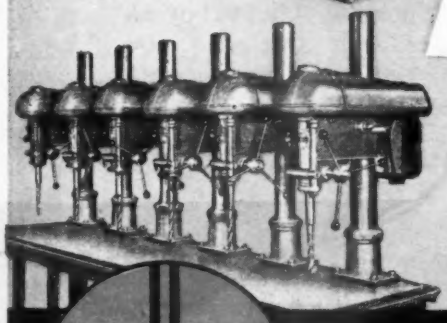
This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

POWER *IS* AS POWER *DOES!*

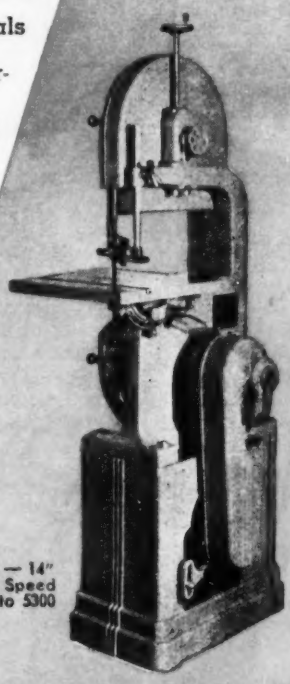
20" DRILL PRESSES —Bench and floor models. Hand or power feed. Spindle speeds 260 to 5200 r.p.m.

RADIAL DRILLS — Drill to center of 62" circle. Spindle speeds 160 to 8200 r.p.m.

METAL CUT-OFF MACHINES—Ball bearing sliding ram travels 21½". Cuts all types of materials at any angle.



20" MULTI-SPINDLE DRILL PRESSES—2, 4, 6-spindle models. Hand or power feed.



BAND SAWS — 14" and 16" models. Speed range from 61 to 5300 s.f.m.

● Not a pound, not a horsepower "loafs" in a Walker-Turner Machine Tool. Thoughtful design and careful selection of materials have made them flexible, versatile and stream-lined—yet rugged and accurate. And most of them operate on minimum horsepower requirements.

They are substantially increasing production on thousands of machining operations, involving materials from steel to plastics. They are scoring marked savings for their users in capital investment, operating costs and power consumption. If you're interested in advantages like these, write for our catalog today.

WALKER-TURNER COMPANY, Inc.
PLAINFIELD, N. J.

walker-turner COMPANY, Inc. PLAINFIELD, N.J. U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Then he said to himself—

"IMITATE IN GOOD THINGS"

THERE'S a sermon in the words of China's leader, Generalissimo Chiang Kai-Shek, as blue laws were clamped on his people's tendency to imitate our jitterbuggy way of life. Said he:

"CHINA IS FAR BEHIND THE WEST IN INDUSTRIALIZATION. WE WANT TO IMITATE THE WEST IN GOOD THINGS . . . WHY IN SUCH THINGS AS DANCING?"

Well he knows that example is contagious behavior. Well he knows that it is by imitation, far more than precept, that men can learn effectively and build on that knowledge.

Well he knows that his industrial men see, in the material coming from America, that recourse to ARC WELDING provides three basic GOOD THINGS for China's victory, for China's industrial effectiveness, for China's social advancement . . .

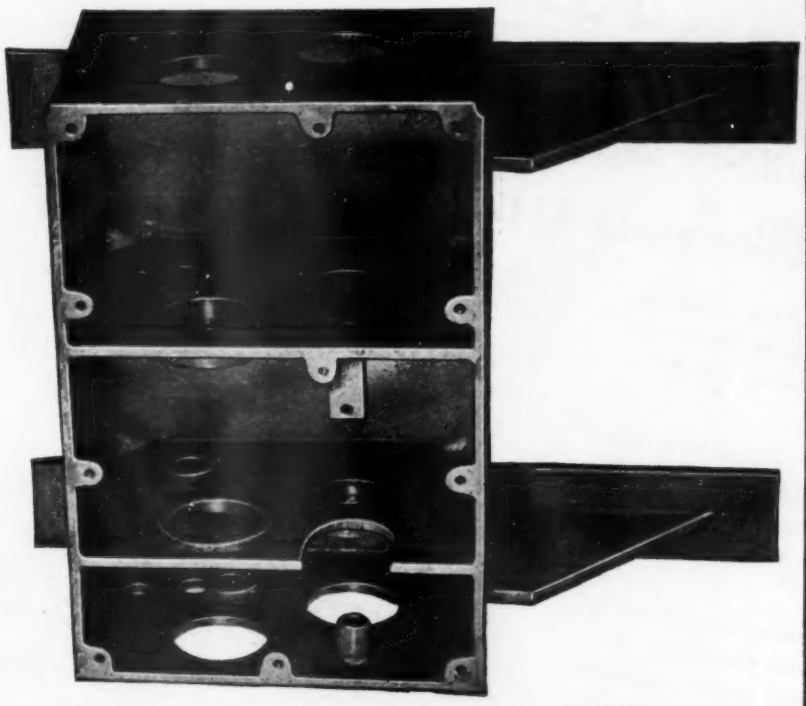
(a) faster production of more products

(b) more effective products

(c) for less money.

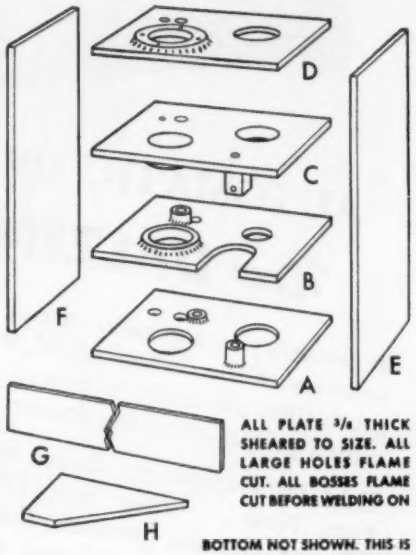
"Imitate in good things," he says

Here, Generalissimo, is a GOOD THING to imitate . . . just one of thousands of designs that have been converted to welded steel to get *better performance and lower cost:*



A GOOD THING IN TRANSMISSION CASES

Changeover of this transmission case of a trenching machine to welded steel construction cut total cost from $25.80 to $14.85 or 42.5% and trimmed weight from 215 lbs. to 180 lbs. Discussion of the conversion of this and other parts of the trencher is given in Machine Design Sheets now being distributed. Free on request to engineers, designers and production supervisors.



ALL PLATE 3/8 THICK SHEARED TO SIZE. ALL LARGE HOLES FLAME CUT. ALL BOSSES FLAME CUT BEFORE WELDING ON

BOTTOM NOT SHOWN. THIS IS A 14 3/8 x 21 7/8 x 3/8 PLATE

HOW IT IS BUILT

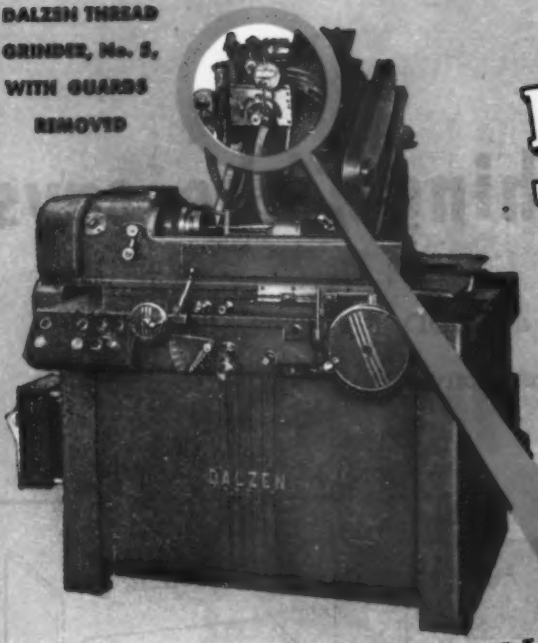
Pieces made of plate were sheared to size and all holes flame-cut. Circular pieces for bosses were flame-cut; bar stock parts were sawed. Pieces A, B, C and D were jigged for the welding on of bosses and bars. The whole was then clamped and tack welded. Joints were made by lapping 3/16", using a full corner weld. The finish welding was done on a positioner. Brackets, made of pieces G and H, were welded last, the welding being alternated between brackets to give more uniform heat distribution and minimize distortion.

THE LINCOLN ELECTRIC COMPANY • Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING

DALZEN THREAD GRINDER, No. 5, WITH GUARDS REMOVED



IN THREAD GRINDING . . . THE *DRESSER'S* THE THING!

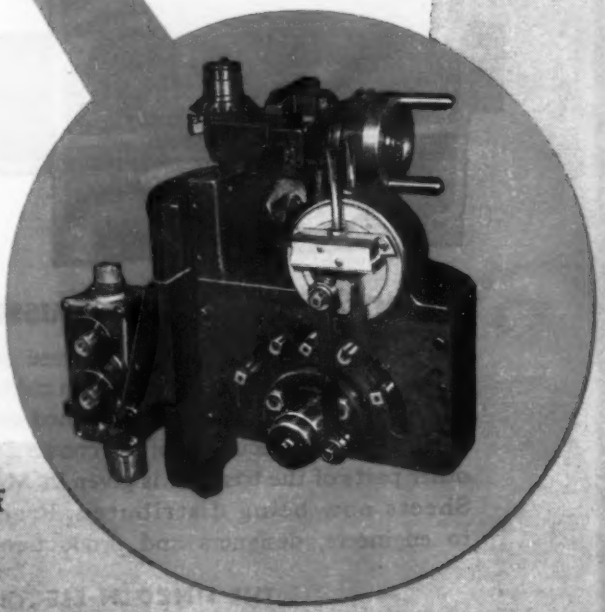
AUTOMATIC DRESSING IS PROVIDED IN THIS *New* DALZEN *Electronic* THREAD GRINDER

● Accuracy of a ground thread depends upon the accuracy of the dressed wheel. Precision, finish and production efficiency in thread grinding are determined primarily by the dresser.

DALZEN engineers always have recognized this fact. Now . . . the new DALZEN Electronic Thread Grinder presents the latest and best in dresser efficiency—offering new and special advantages in dressing performance.

The new DALZEN Thread Grinder with General Electric Thy-mo-trol drive provides maximum production of threaded parts, thread gages, straight and spiral fluted taps, and thread milling cutters. Grinding speed—both wheel and work—forward and reverse—is adjusted by the twist of a dial. Variation is infinite and stepless. It's an investment in *better* thread grinding, and a *low-cost* investment at that!

An attractive three-color folder describing the new DALZEN Models 5 and 6 will be sent you, free of charge, on request.



DALZEN

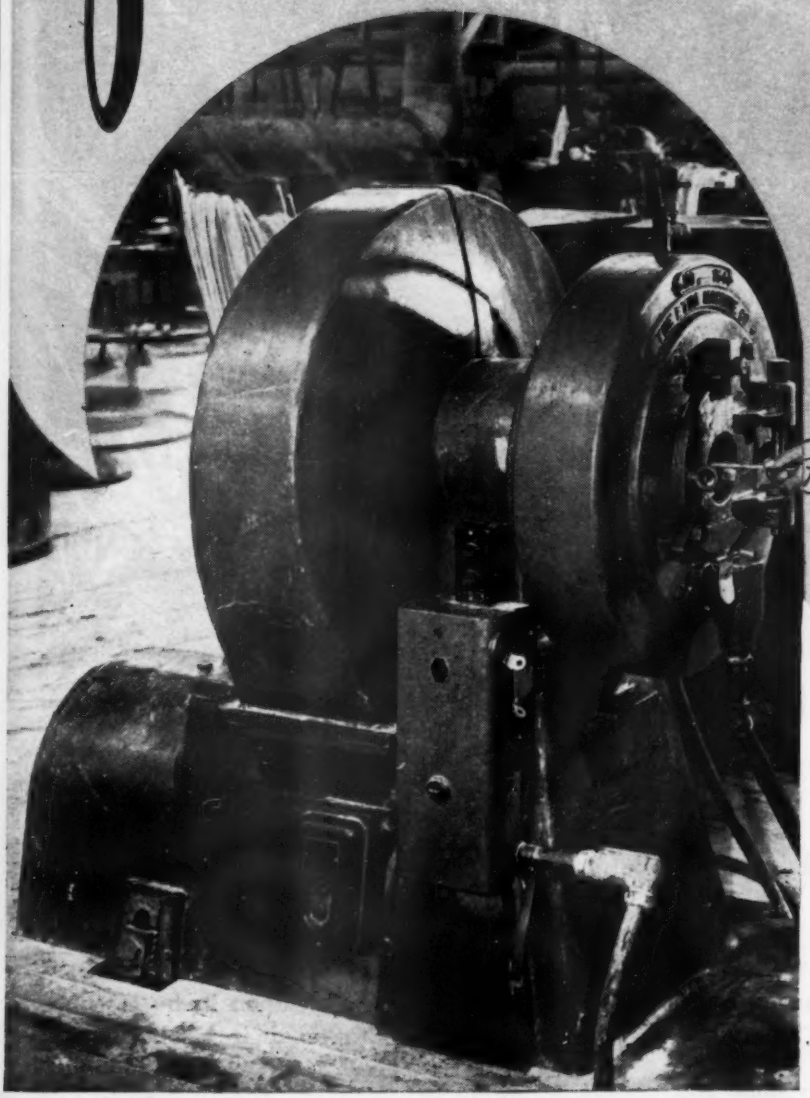
TOOL & MANUFACTURING COMPANY

12255 EAST EIGHT MILE ROAD • DETROIT (5), MICH.

Pointing wire . . .

. . . the easy, fast, low cost **ETNA** way

. . . in a well known midwest plant



● Again ETNA comes to the front in war production! Here a standard ETNA Swaging Machine of the same type that served efficiently in peace-time is doing a vital wartime job. The operation performed is wire-pointing prior to drawing. Obviously we cannot give production figures or name the plant where this ETNA unit is located, but past performance records prove that this machine is fast . . . accurate . . . and dependable!

Perhaps Swaging can speed *your* production too. Write, giving details on your operations. Let us show you how ETNA Swaging Machines can **speed production and reduce costs.**

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

"Ask ETNA about Swaging

The **ETNA** *Machine Company*

3400 MAPLEWOOD AVENUE

TOLEDO 10, OHIO

CONTROLLED HARDNESS

One of the primary reasons for the amazing efficiency of MID-WEST MICRO BOND honing and superfinishing stones is the degree to which hardness of individual stones is controlled.

Abrasive specialists use the term "grade" in referring to the hardness of a given stone and any abrasive man knows that the "grade" of a stone can spell the difference between success and failure in a honing or superfinishing operation. Hardness of stones should vary according to the metal being honed and much depends on selection of a stone of the *right* hardness for a given job.

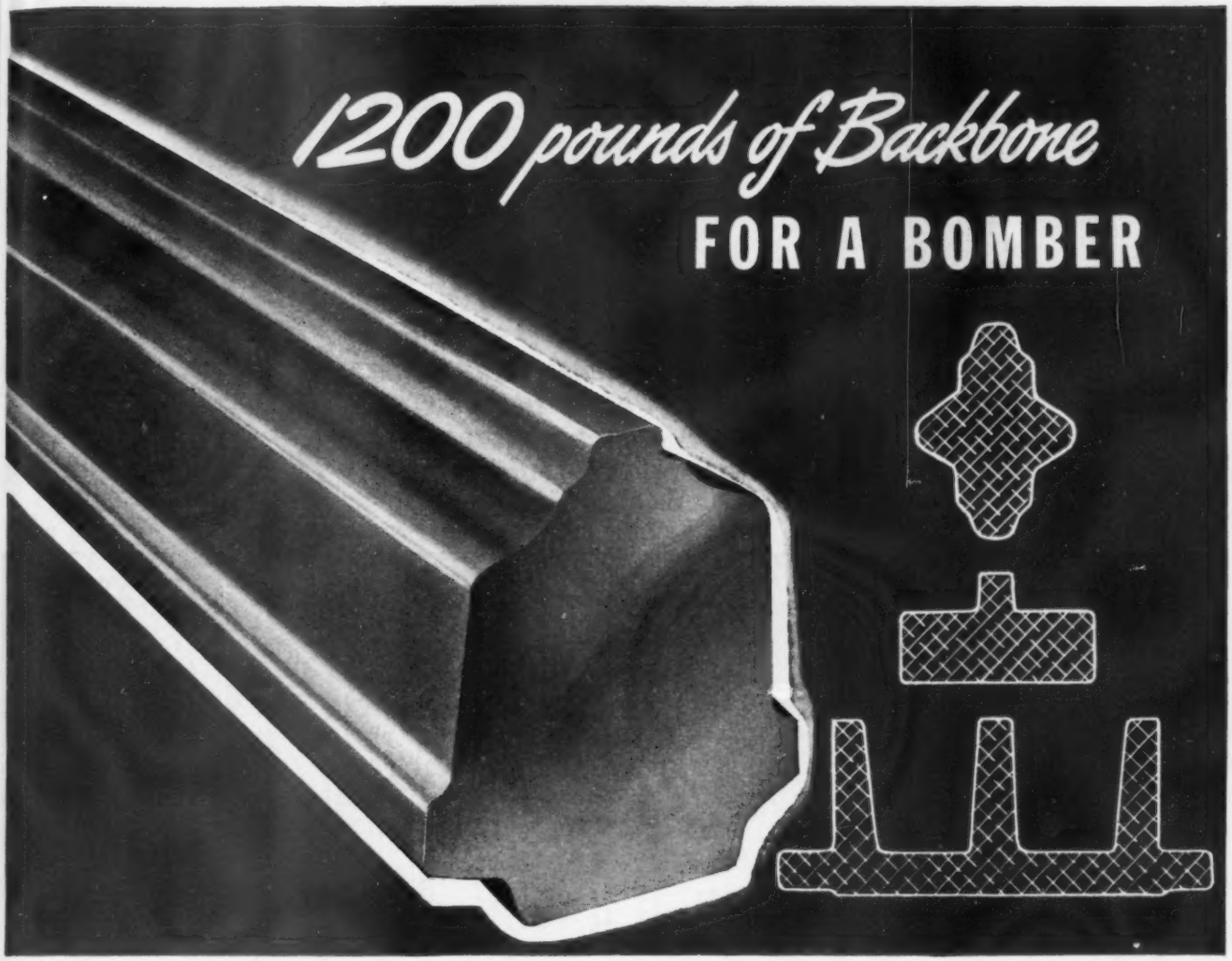
MID-WEST MICRO BOND honing and superfinishing stones are manufactured under a process that definitely predetermines hardness and they can be depended upon to be of the precise hardness shown on their label. That's one reason MID-WEST MICRO BOND honing and superfinishing stones are being used extensively in producing ships, guns, planes and tanks for the United Nations.

Let a Mid-West service engineer help you select the RIGHT stone for your honing job. You'll find one located near you and you'll find him eager to assist you.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. Milwaukee Avenue **Detroit 11, Michigan**



What will this wartime development do for you?

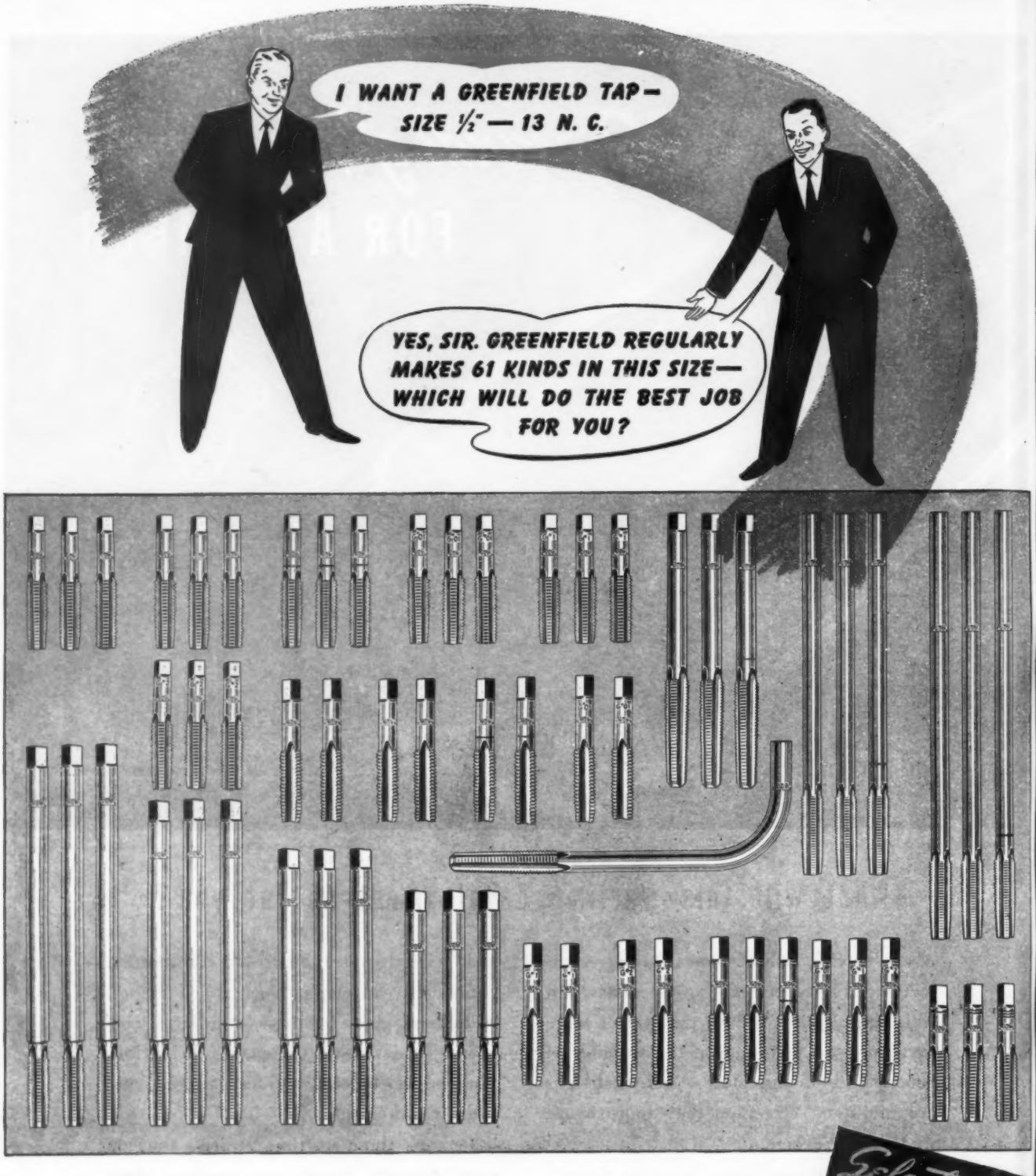
Alcoa special rolled shapes having cross sections as large as thirty square inches, and weighing 1,200 pounds per piece, have saved many a man-hour in the assembly of America's bombing planes. Actual designs are a military secret, but they approximate what you see here.

Rolled structural shapes have the distinct advantage of long lengths. This means that fewer joints are required, resulting in less dead weight and faster assembly.

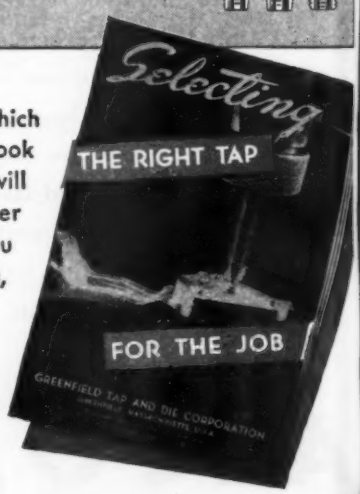
This development, coming out of the war, opens up entirely new realms of design. As in our airplanes, builders of railroad cars, buses, boats and construction equipment can employ such rolled shapes. Aluminum gives lightness, sturdiness, corrosion resistance and easy fabrication. Shapes are tailored to suit stresses and other requirements.

Perhaps those wartime projects now on your drawing board can employ Alcoa Aluminum rolled structural shapes to save man power and materials. And how about your postwar designs? Alcoa engineers will gladly help you determine the facts. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA ALCOA ALUMINUM REG. U. S. PAT. OFF. **ALUMINUM**


I WANT A GREENFIELD TAP—
SIZE ½" — 13 N. C.
YES, SIR. GREENFIELD REGULARLY MAKES 61 KINDS IN THIS SIZE—
WHICH WILL DO THE BEST JOB FOR YOU?

IT'S TRUE. Shown above are the 61 different kinds of ½"—13 N. C. Taps which "Greenfield" lists in its catalog, not including special "Maxi" finish taps. Many look identical, but each has its own particular qualities and usefulness. . . . Which one will do the best job for you? That is a "$64 question" that Greenfield helps you answer in its new booklet "Selecting the Right Tap for the Job." If you need more help, you can call on Greenfield's staff of expert screw thread engineers for recommendations, or ask a Greenfield field service engineer to call.



GTD GREENFIELD
AGES APS IES

GREENFIELD TAP & DIE CORP.
GREENFIELD MASSACHUSETTS

PHYSICAL AND CHEMICAL PROPERTIES

PIN A MEDAL ON *Yourself!*

"Mr. Dag"

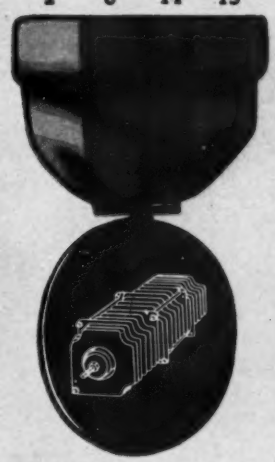
You get far more than just a smooth, black liquid concentrate when you use Dag colloidal graphite. A versatile group of valuable properties is also at your service. The most important of these properties are listed here. A color and a number is given to each for easy reference.

In the typical applications below, trace the record of some of these properties. You can do this simply by matching the ribbon colors against the property chart.

1 3 14 13 15

1, 3, 14, 13, 15
CITATION: "Die and punch life is increased and forgings having better finish are produced to closer tolerances with Dag colloidal graphite treated lubricants."

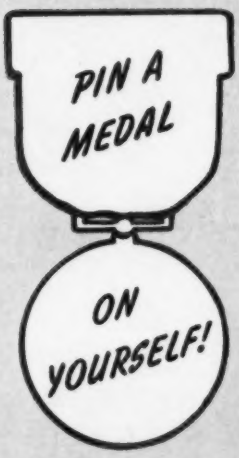
2 6 14 13



2, 6, 14, 13
CITATION: "Excellent electrical contact is obtained between copper oxide discs and adjacent metal electrodes in rectifiers when dry coatings of Dag colloidal graphite are used on the crystalline oxide surfaces."

1 2 3 14 8

1, 2, 3, 14, 8
CITATION: "Dag colloidal graphite is extensively used to impregnate asbestos packings for pumps handling chemicals and explosive fluids. It protects the packing against chemical action and provides safe, dry lubrication."



Check this list and pick out those properties which you can use. Then state your problem to us and let our engineers give you the benefit of their experience. It is quite possible that they have already studied a parallel application. You'll pin a medal on yourself for calling in Mr. Dag.

Dag, Oildag, Aquadag, Glydag, Castordag and Prodag are registered trade marks of Acheson Colloids Corporation. Copr. 1944 by Acheson Colloids Corp.

dag
REG. U.S. PAT. OFF.
COLLOIDAL PRODUCTS

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

1 Slippery—a Good Lubricant. Softer than talc

2 Conducts Electricity

3 Withstands Temperature Extremes

4 Absorbs, Radiates and Conducts Heat

5 Maximum Purity

6 Low Coefficient of Expansion

7 Particles Bear Like Electric Charges

8 Insoluble in Acids and Alkalies

9 Black and Opaque

10 Gas Adsorbent

11 Little Photoelectric Effect

12 Miscible with Most Fluids

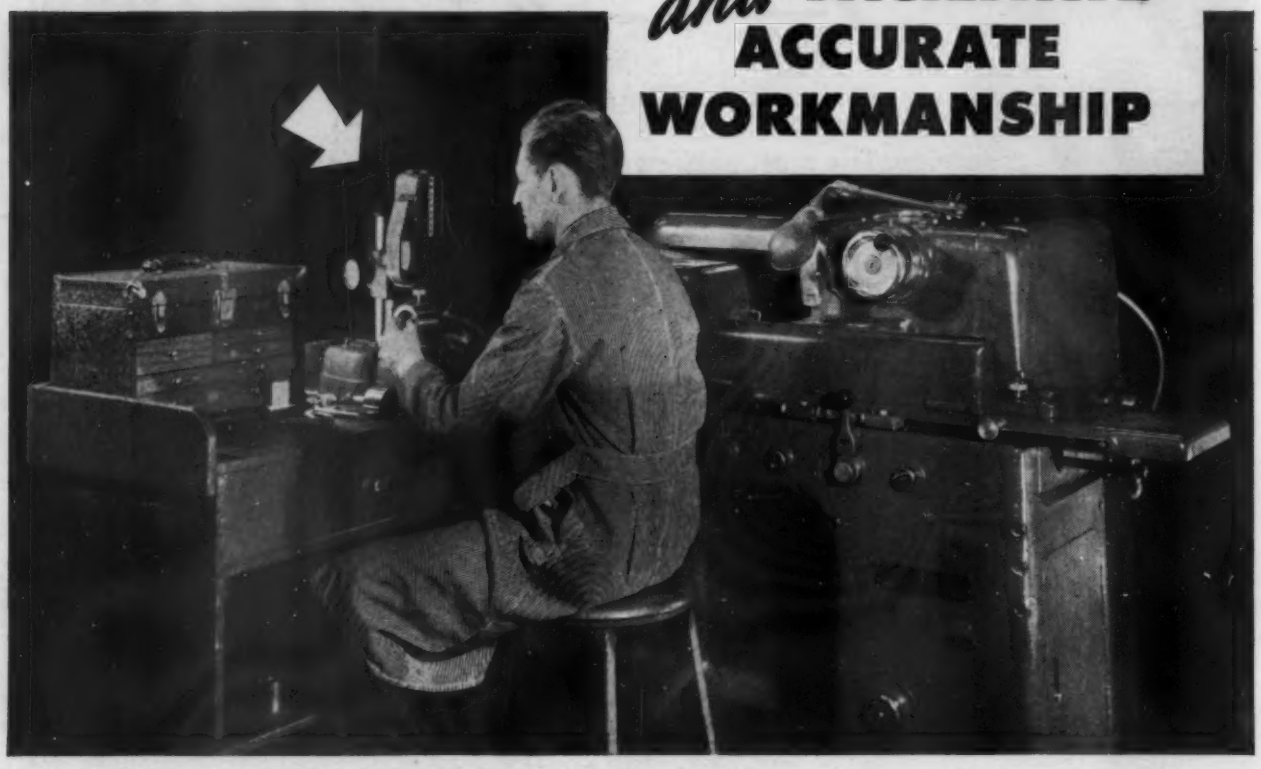
13 Films Adhere Tenaciously and Dry with Sharp Edges

14 Microscopically Fine Particles. Penetrates Fine Pores

15 An Excellent Suspension

Gagemakers GUARD Against Costly Scrap

and FACILITATE ACCURATE WORKMANSHIP



Visual Gage and precision grinder in a modern gagemaking plant.

Beside each precision grinder in many gagemaking plants, a Sheffield Visual Gage guards against costly scrap loss and helps operators turn out highly accurate work. *The Visual is the most widely used instrument by which gages are checked.* Sheffield appreciates this trust and is vigilantly mindful of the obligation it involves.

Hundreds of production plants also use Visuals at their precision grinders to help reduce scrap and obtain a higher rate of accurate production. *The Visual is recognized throughout industry as the authority on PRECISION.*

DELIVERIES WITHIN TWO WEEKS can now be made on Sheffield Visual Gages of six different amplifications—500, 1000, 2000, 5000, 10,000, and 20,000 to one. WIRE OR WRITE.

ARMY E NAVY

SHEFFIELD MASTER CRAFTSMEN

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • DIMENSIONAL CONTROL • CONTRACT SERVICES

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

Back of every Lake Shore Tool are the facilities and skilled personnel of one of America's most completely equipped plants.

LAKE SHORE TOOL WORKS

Division of Carbide Tool Company

Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

816 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS

Grinding Wheels

Fifty years ago The Carborundum Company introduced the first grinding wheel of a manufactured abrasive to the foundry trade

WE have come a long way since then—a long way in grinding wheel development—in the technique of grinding wheel manufacture.

Carborundum research through all these years has resulted in new types of abrasive grain, continuously improved bonding materials—an unprecedented advancement in the creation of wheel structures—plus the development of high speed resinoid bond wheels.

This progress is reflected in longer wheel life, faster and greater stock removal—a definite lowering of foundry grinding costs.

And it is a progress that is still going on, for Carborundum research, of course, never stands still.

Wise grinding procedure dictates that you make certain you are using the right wheel for a given job—right grit, grade and structure, the right type of abrasive. The use of the wrong wheel usually means loss of production, excessive wheel wear and excessive wheel and grinding costs.

Remember, please, that Carborundum Abrasive Engineering Service is maintained to help you get the most and the best out of your grinding wheels. It will pay you to take advantage of the knowledge and experience that is back of this service.

Grinding wheels are weapons for production—use them wisely and well. The Carborundum Company, Niagara Falls, New York.

* * *

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids.

CARBORUNDUM
TRADE MARK
ABRASIVE PRODUCTS

(Carborundum is a registered trade mark of and indicates manufacture by The Carborundum Company)

by CARBORUNDUM
TRADE MARK

Saves $157 a week in cutting oil

Instead of a drum of oil (@ $25) every day, a New Jersey plant* now uses only one drum every 10 days, since installing a Model 26 American Chip Wringer. And they're handling more work.

In less than *3 minutes* an American Chip Wringer reclaims more than 90% of the cutting oil from metal chips and machine turnings. Any unskilled person can operate it and run 7 to 8 loads an hour, including loading and unloading. It will pay you to investigate.

American Chip Wringers are available in following models:

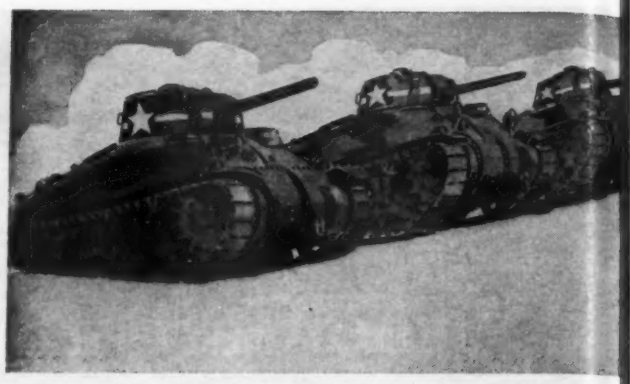
Model 20
Model 26
Model 30
Model 40
Model 48

WRITE TODAY FOR ILLUSTRATED CATALOGS

ARMY E NAVY
CINCINNATI PLANT

*Name furnished on request

The AMERICAN LAUNDRY MACHINERY COMPANY
CINCINNATI 12, OHIO

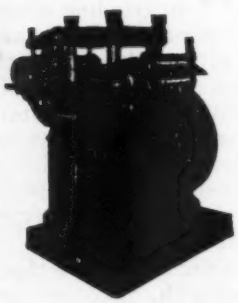


We design and build special machinery, pumps, turbines, Diesel engines, etc.

Add to your plant capacity, and protect your delivery schedules, by using our Subcontract Department. Whether you want us to start with the designing and engineering, or only to manufacture, the facilities of this plant are at your disposal. We are turning out some very high type work on pumps, engines, turbines, special automatic machinery and various precision sub-assemblies, and we can assure you that any project you refer to us will be competently and expeditiously handled.

THE MODERN METHOD OF PRODUCING STAMPINGS
H & W DIEING MACHINES

Made in capacities of 10 tons to 800 tons, this unique automatic press turns out multiple-operation stampings complete per stroke at new high standards of production and precision. Of unmatched versatility, it turns out stampings of unusual intricacy, including difficult steps such as broaching.



REQUEST CATALOG 44

THE HENRY & WRIGHT MFG. CO.
481 Windsor St. Hartford 1, Conn.

Henry & Wright
AUTOMATIC MACHINERY
DESIGNERS AND BUILDERS

Your I S D always was ready—is ready now

Alert to their Country's needs, Industrial Supply Distributors have rendered distinguished service through each of America's major wars during the past 100 years. The Fighting men depend upon the Nation's mills and factories to keep supplies moving to the front lines—the Production men rely upon Industrial Distributors to keep *their* supplies moving up too. Your Industrial Supply Distributor is continually at your call—in war and peace alike. For Cle-Forge High Speed Drills, Peerless High Speed Reamers, and everything else you need to keep your production going—

Telephone your I S D FIRST

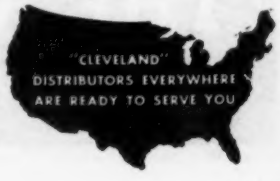
ARMY NAVY

ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD., DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4



You Can Speed Your Production With This Wade Precision Lathe

WADE No. 8-A
TOOLMAKERS' PRECISION LATHE SPECIFICATIONS

Length of Bed	44"
Distance between Centers	24"
Swing over Bed	8½"
Swing over Cross Slide	5½"
Swing over Compound Slide	2½"
Size of Tools	⅜" x ¾"
Cross Slide Travel	5"
Tailstock Spindle Travel	3¼"
Compound Slide Travel	2½"
Collet Capacity	1"
Taper Standard for Centers	No. 2 Morse
Width of Driving Belt	1¼"
Clear Hole through Spindle	1 3/16"
Spindle Nose, Hardened and Ground Threads	2" x 10 TPI
Height above bench to center line of Spindle	12"
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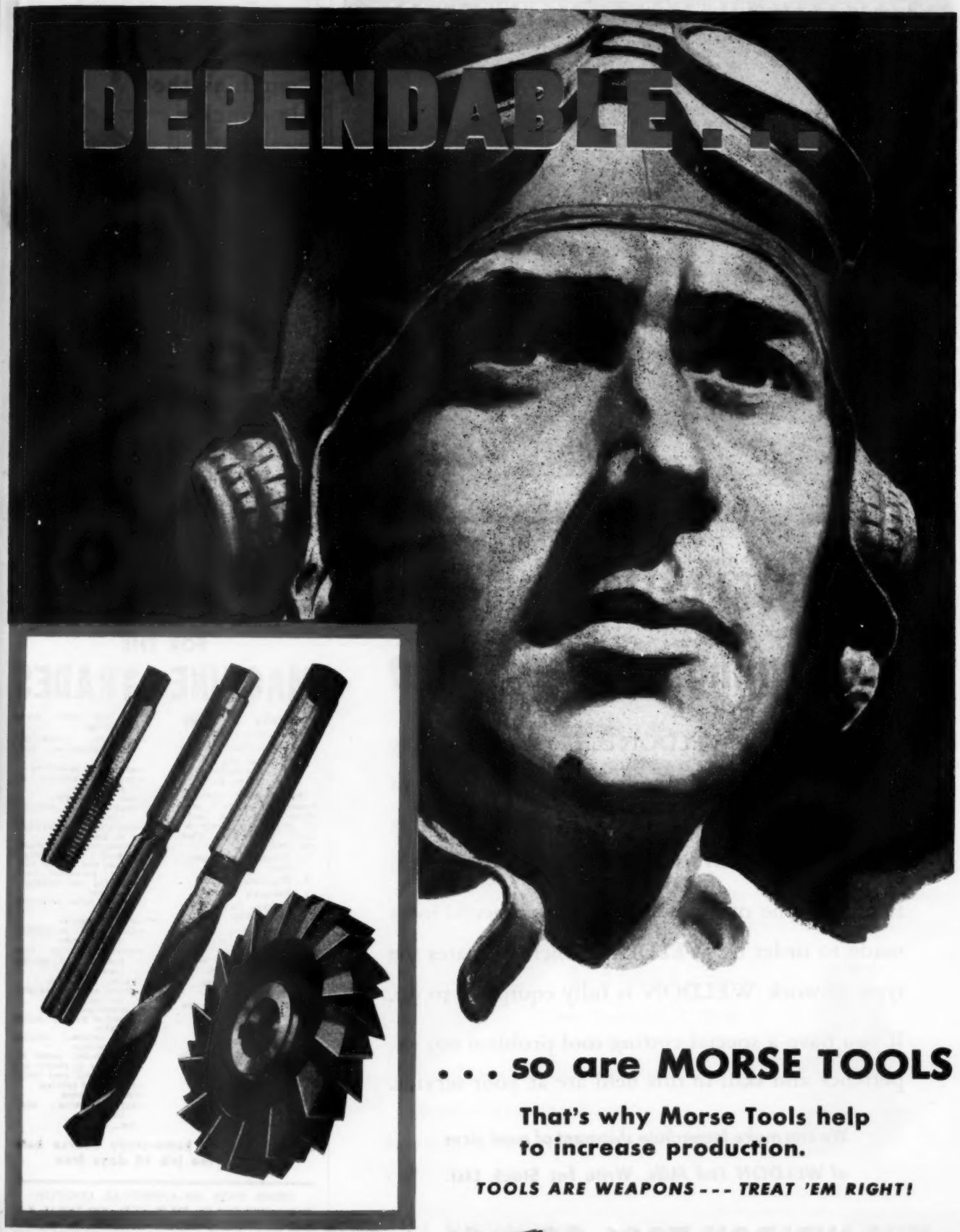

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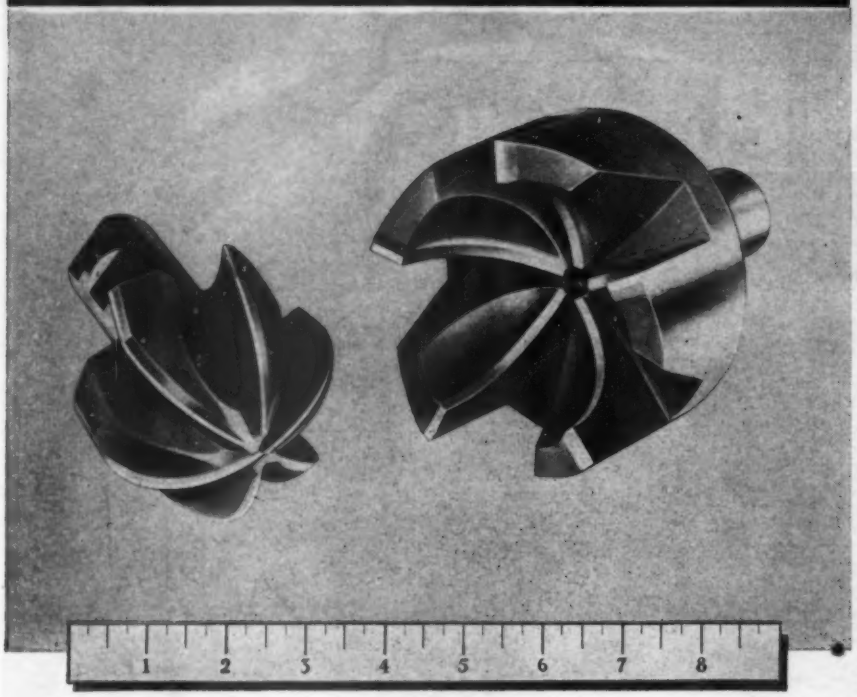

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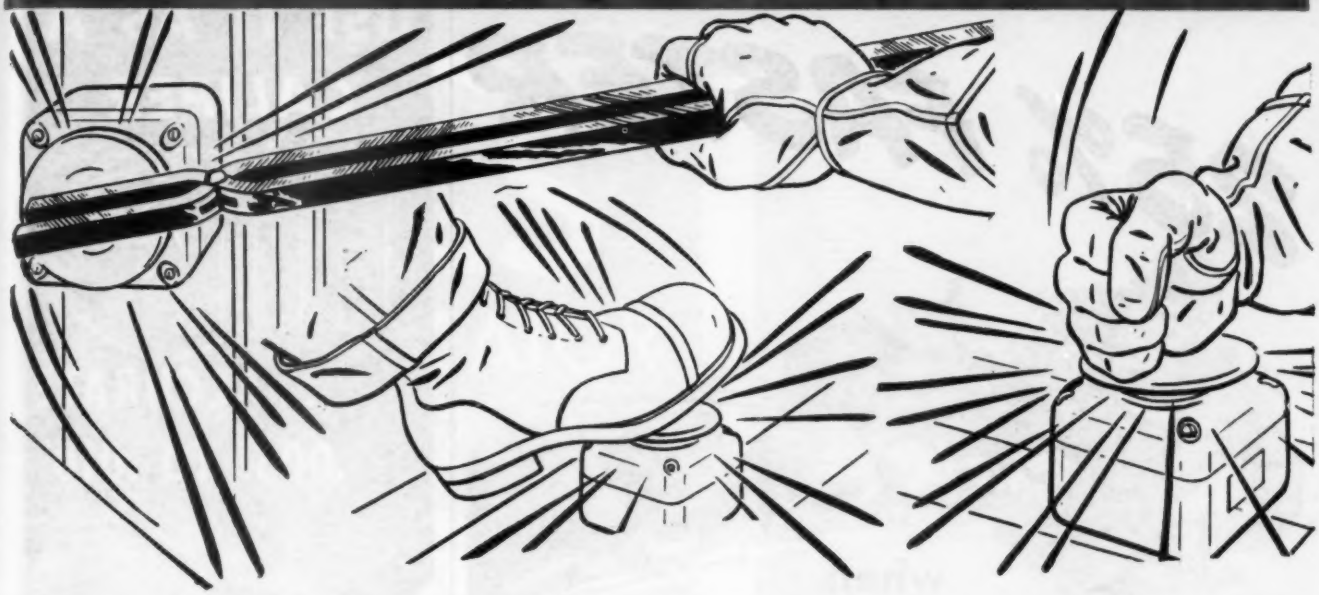

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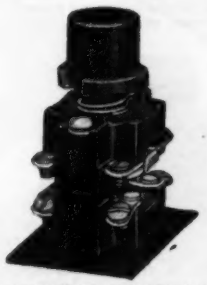

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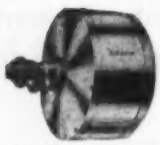

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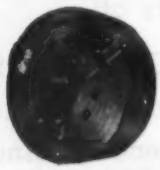

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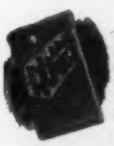

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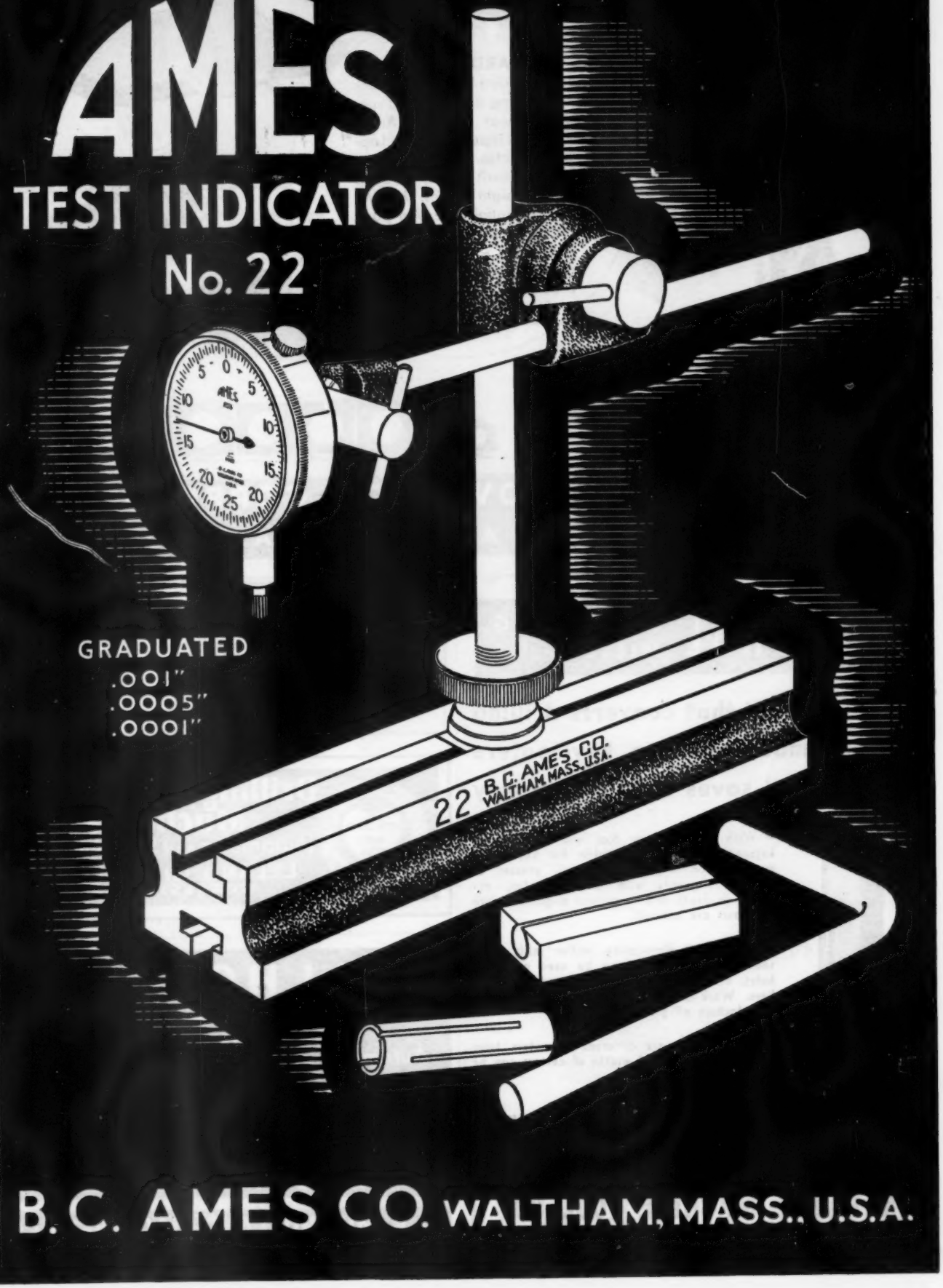

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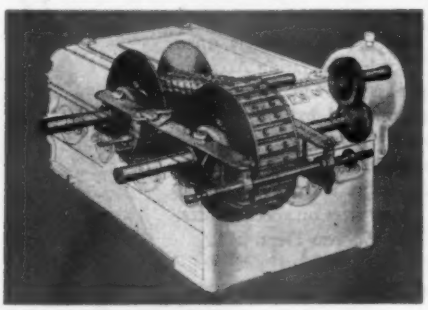

"X-ray" view shows how pinion of reduction gears is mounted on variable speed shaft of Transmission, this shaft serving as input shaft for reducer unit.

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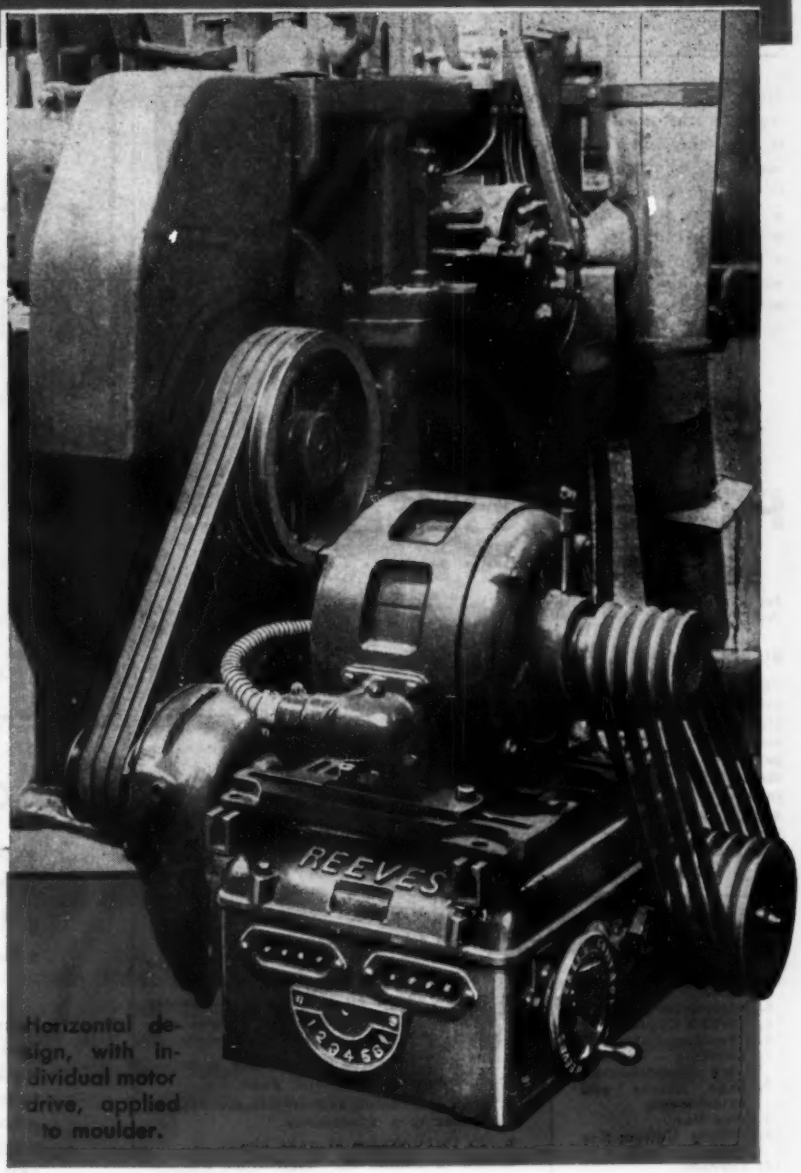

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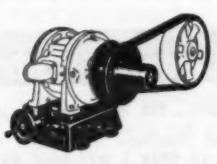

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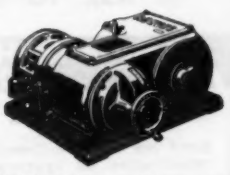

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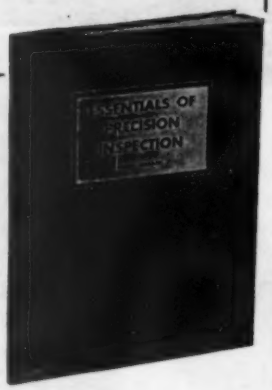

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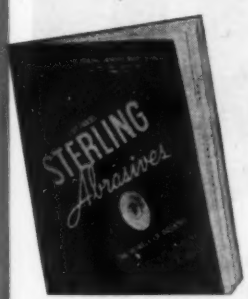

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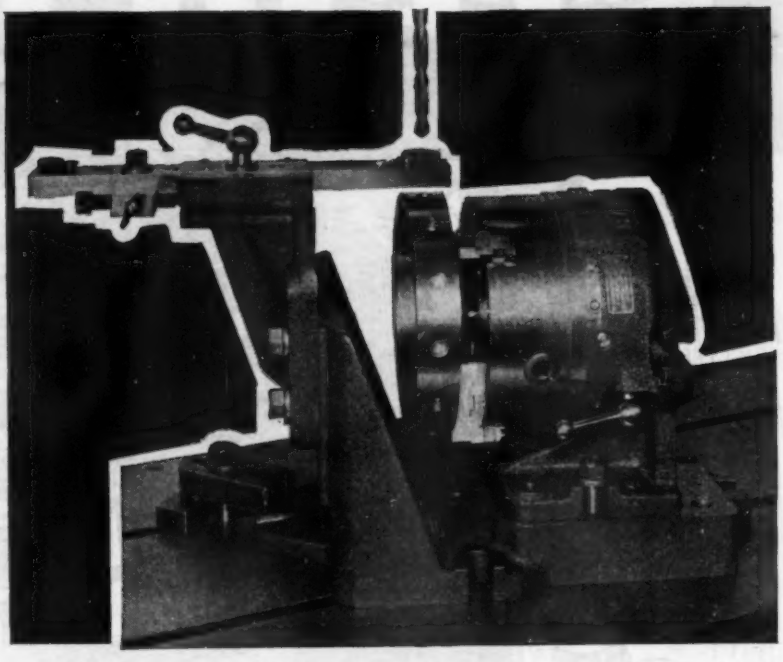

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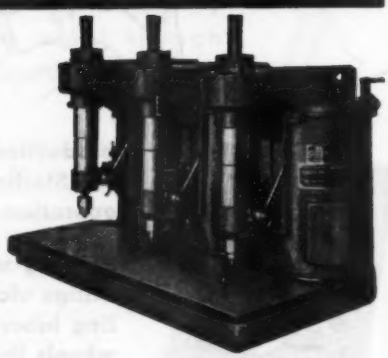

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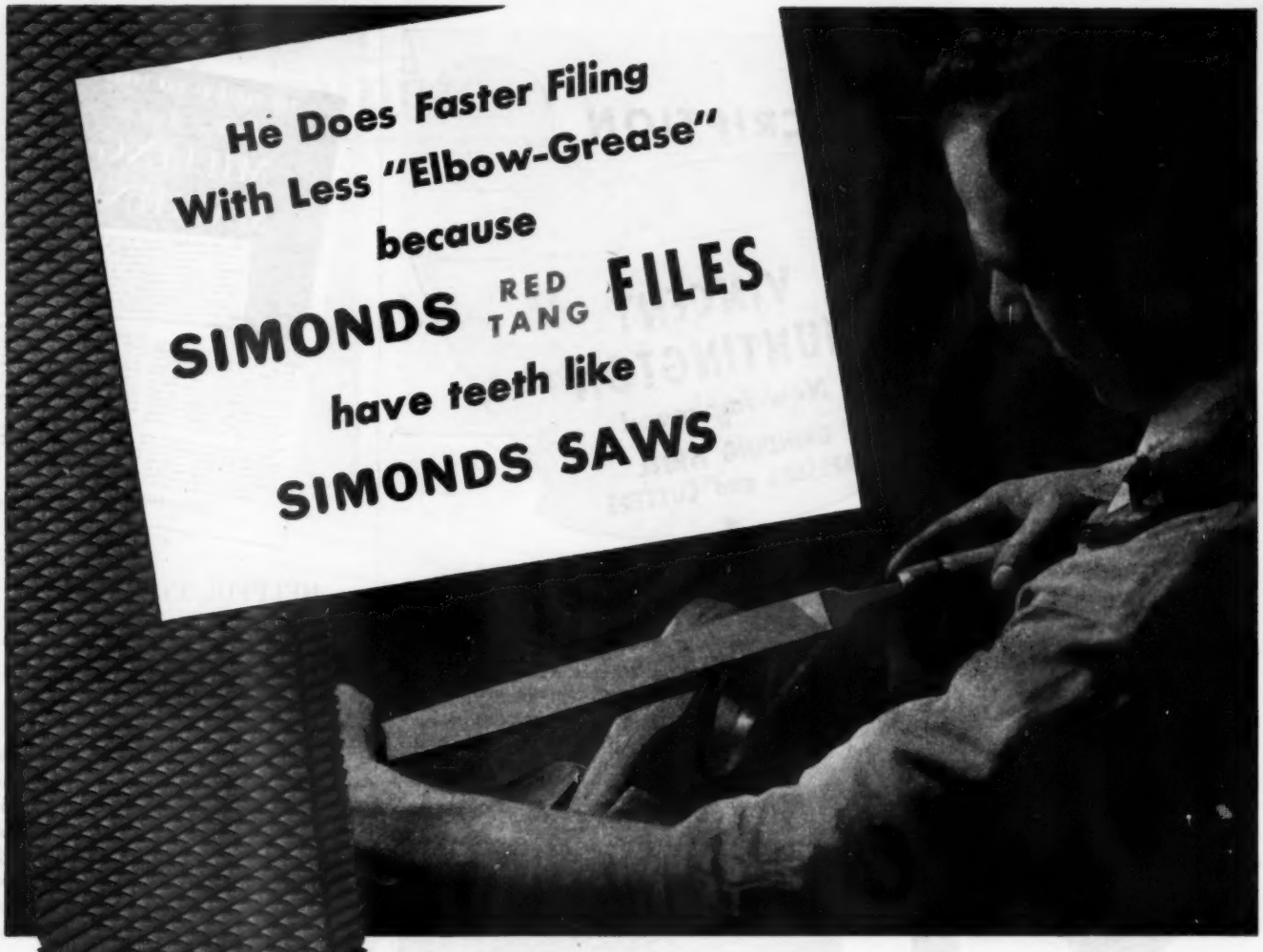

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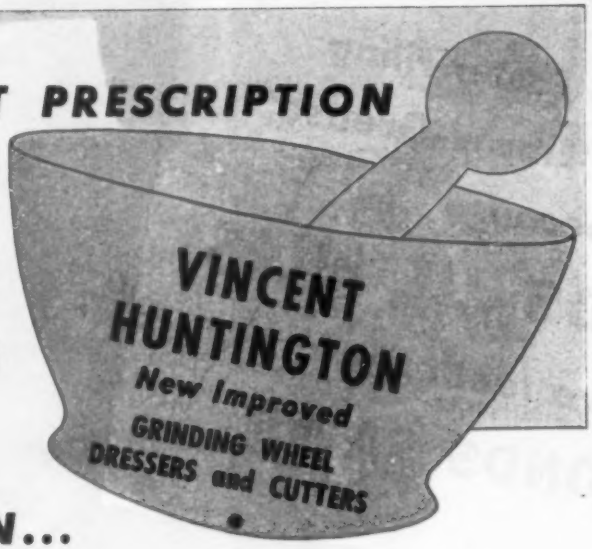

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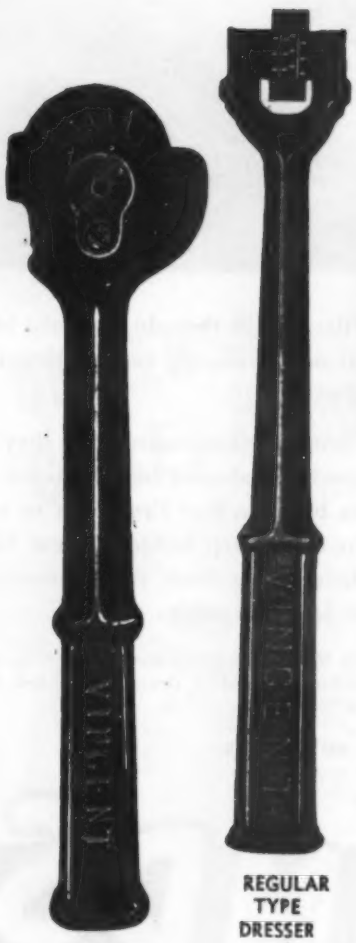

HOODED TYPE DRESSER

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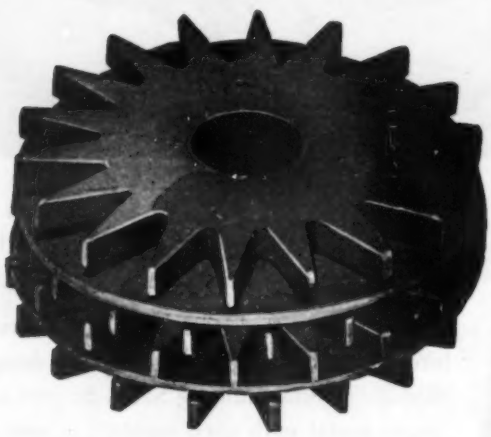

• Grinding wheels, to operate at top production grinding efficiency, must be properly dressed and trued! The regular use of VINCENT-HUNTINGTON New Improved Grinding Wheel Dressers and Cutters will accomplish this vital job . . . save your grinding wheels . . . aid you in speeding War-time grinding operations.

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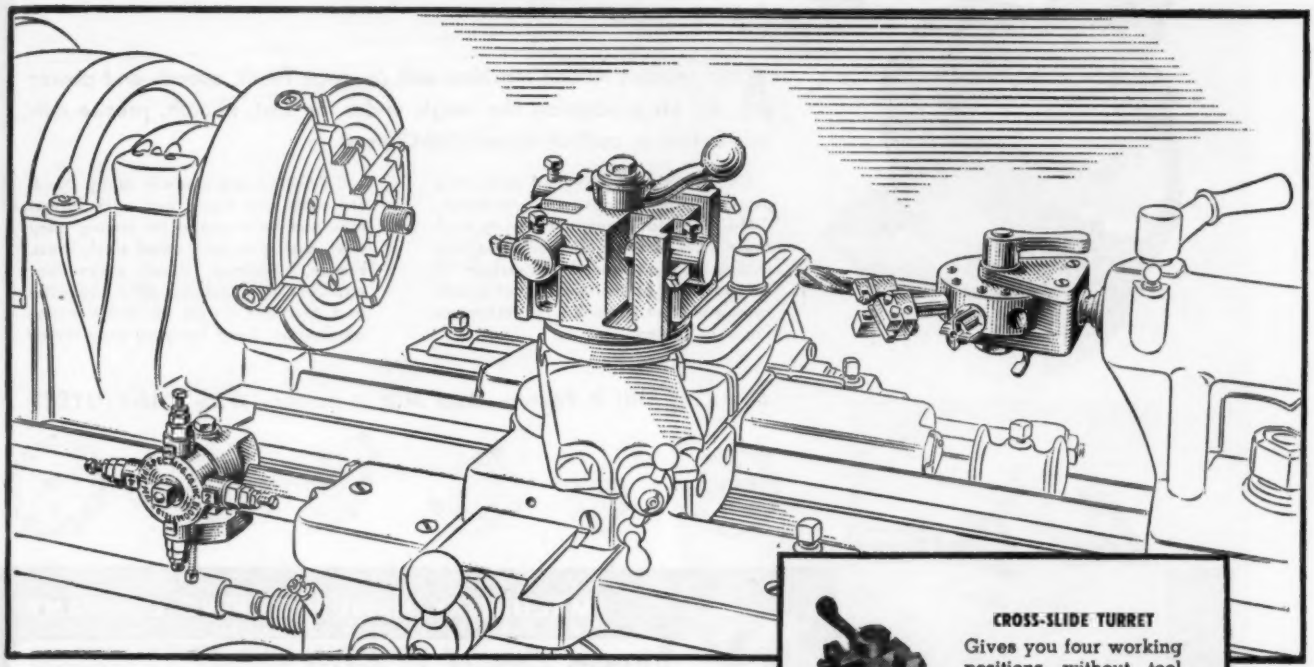

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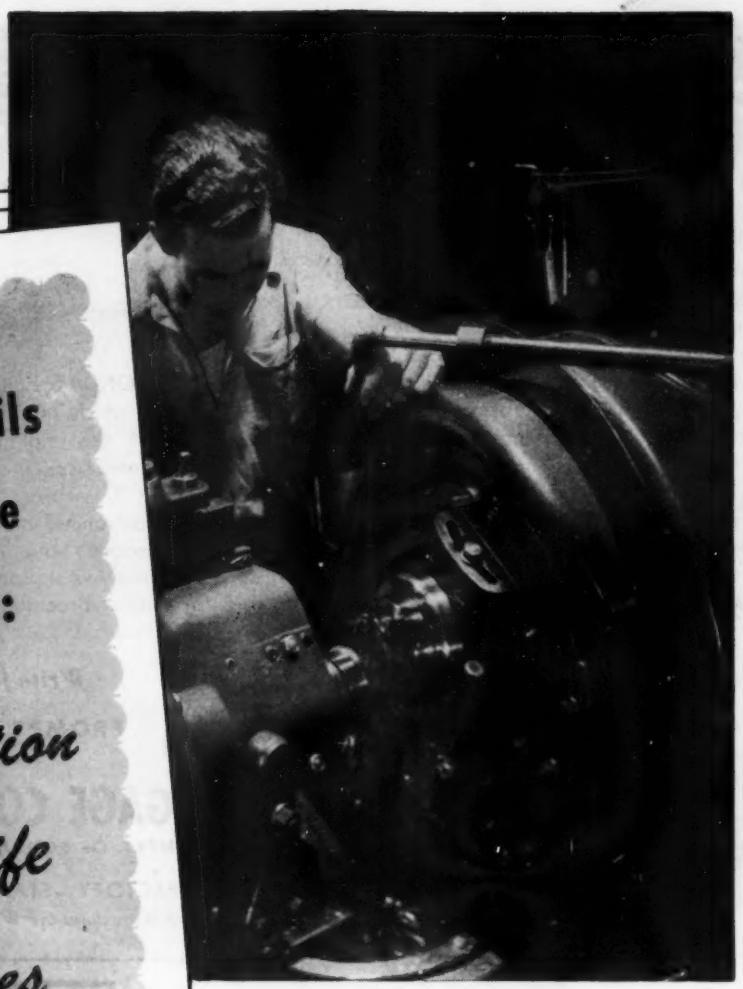

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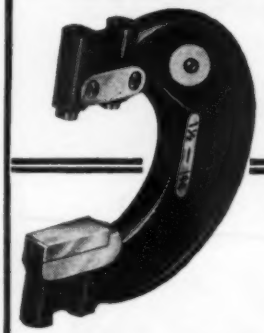

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3. Drilling
4. Cutting Tools
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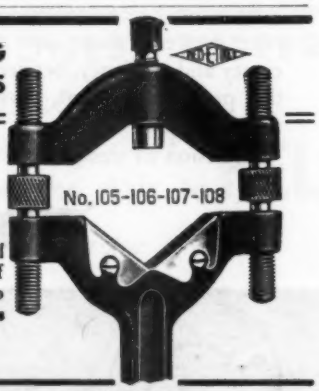

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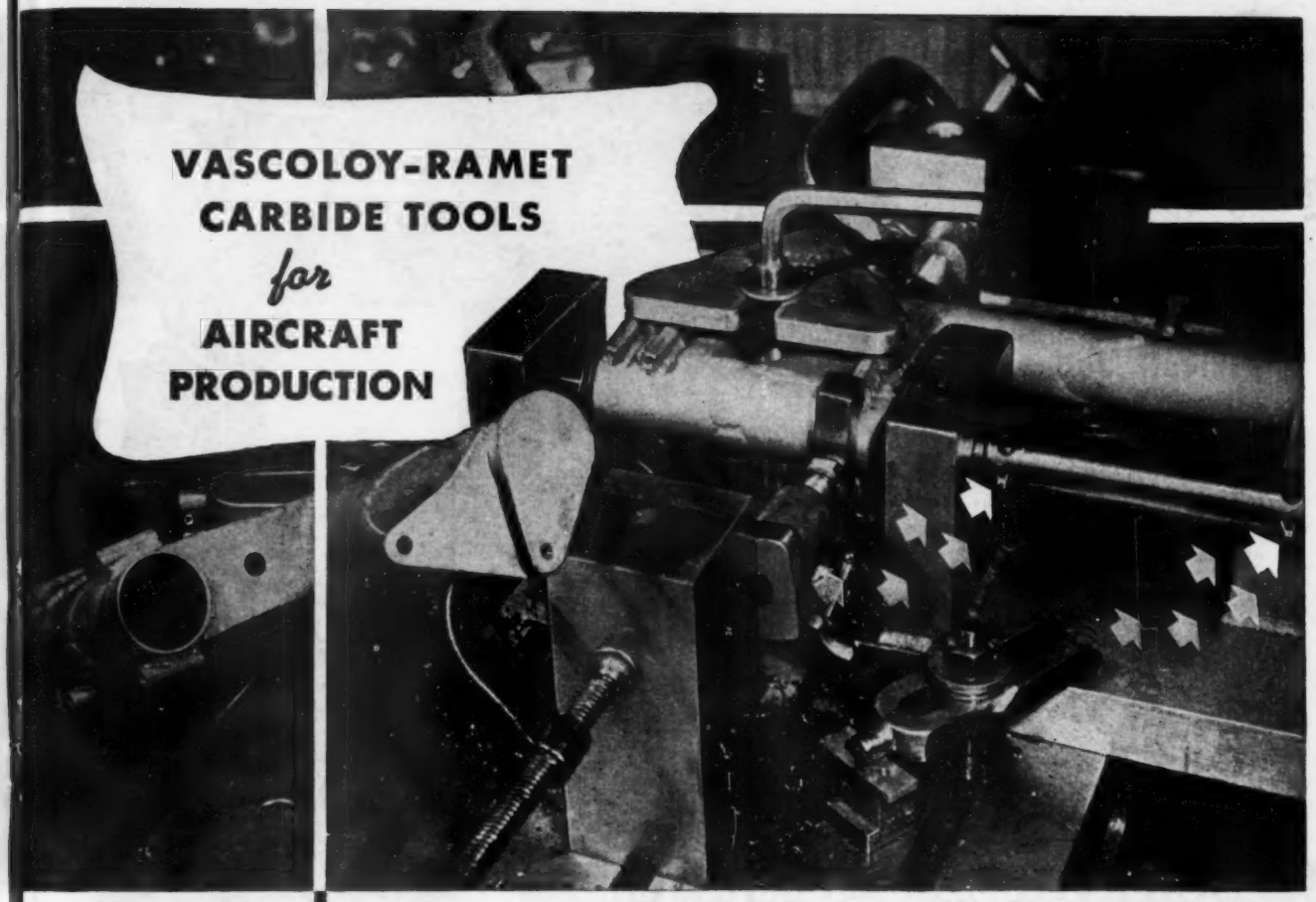

Above: Vascoloy-Ramet Tantalum Tungsten Carbide Tool bits used to advantage in precision boring operations on steel aircraft parts. Machine, Giddings & Lewis Horizontal Boring, Drilling and Milling Machine. Plant, The Lockheed Aircraft Corp.

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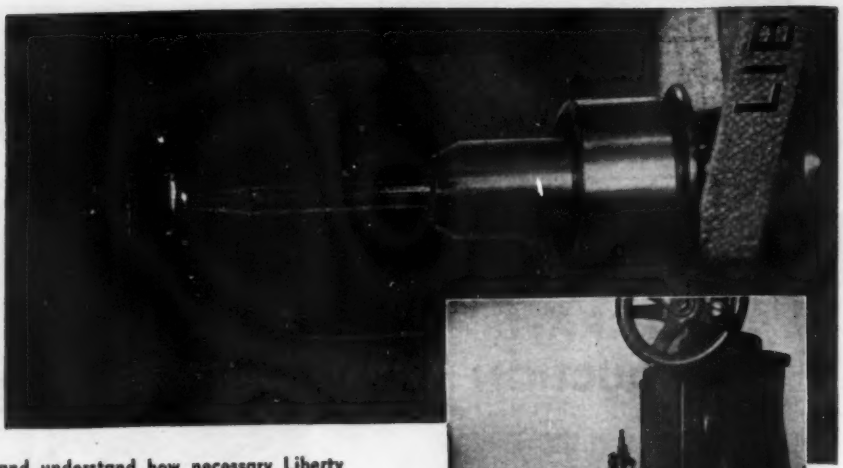

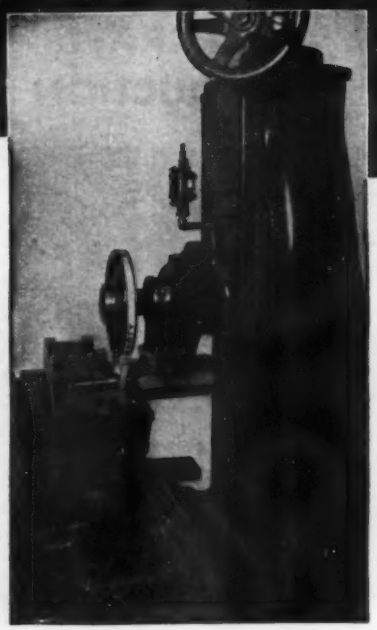

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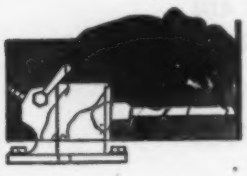

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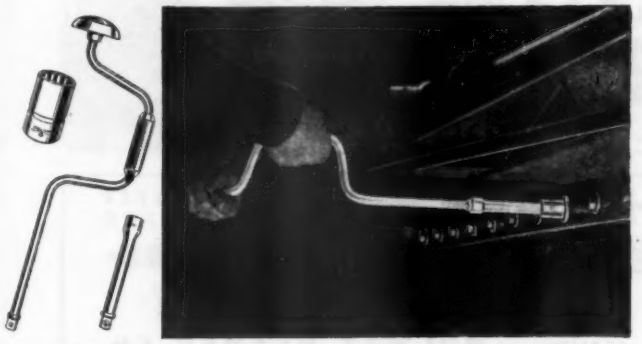
DELICATE WORK. This thin, straight-walled Midget "Supersocket" with Extension-Driver and Sliding T Handle is fast and sure in these cramped quarters where an ordinary wrench could not even reach the nut.



TIME SAVING. The operator assembling this machine quickly tightens a long row of cap screws while standing erect. The Extension Bar between Speeder Handle and Socket permits continuous rotation since handle clears all obstructions.

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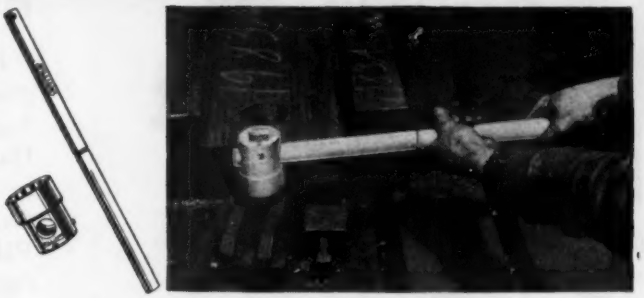
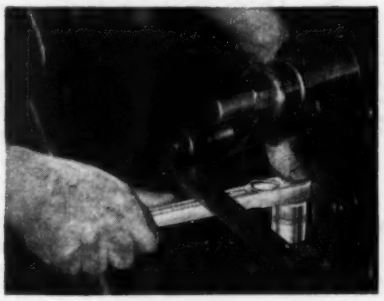
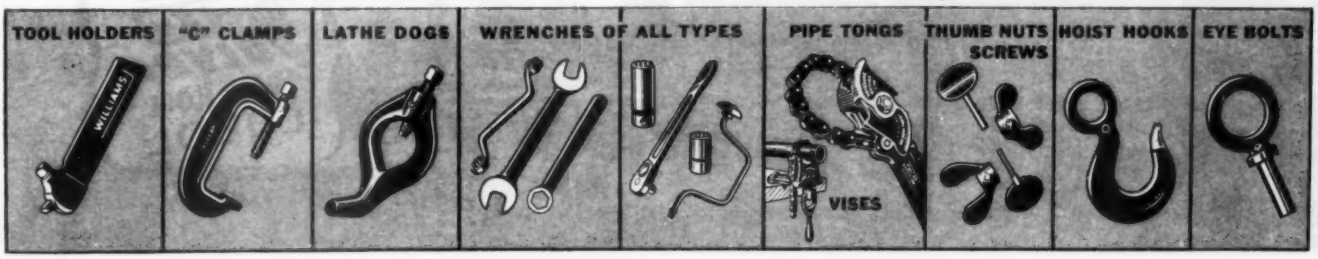


POWER. Tremendous leverage combined with positive grip result from this Extra Heavy Duty "Supersocket" assembly. These sockets are cross-drilled, thus bringing the Sliding Handle close to the work, minimizing the tendency to tip when Socket is used near the end of handle.

HAZARDOUS JOBS. Working from a ladder, this millwright not only gets at an awkwardly-placed nut with this Standard "Supersocket" combination but he can apply heavy leverage without danger of the wrench slipping and throwing him off balance.



OBSTRUCTIONS. With this "Supersocket" Ratchet and Socket, the mechanic "gets around" obstructions that otherwise would have to be removed to make an adjustment. A 30° swing is all that is needed to rotate a nut with this Handle. "Supersocket" Extensions are likewise very helpful in getting at hard-to-reach nuts.



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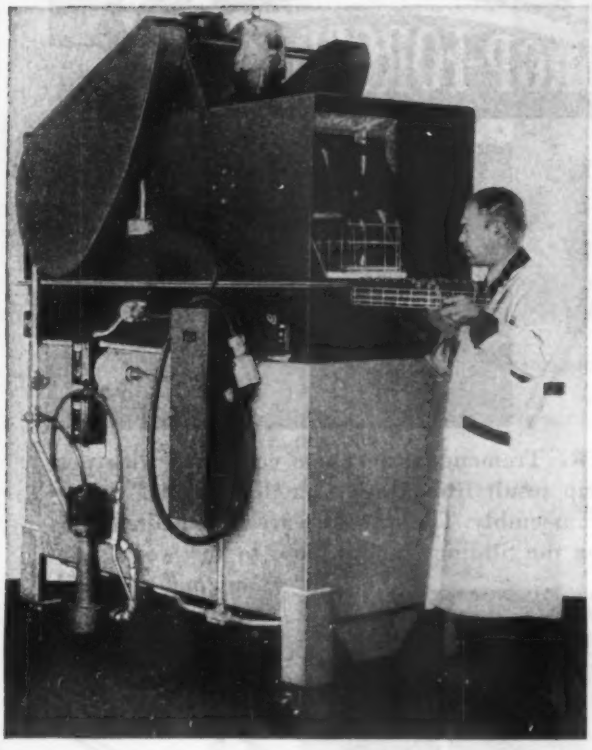

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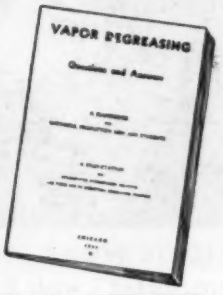

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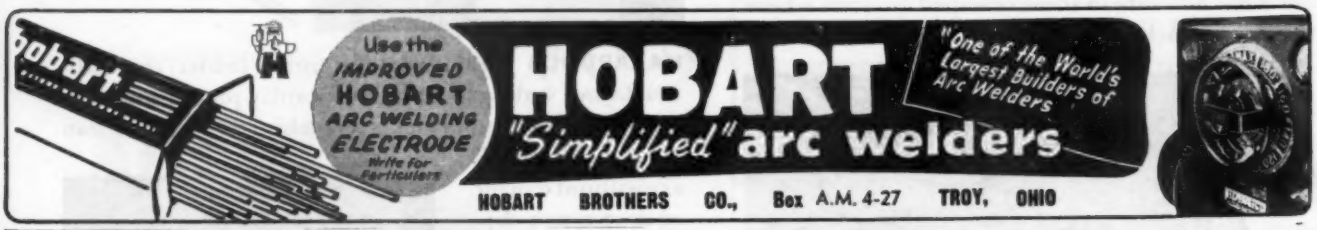

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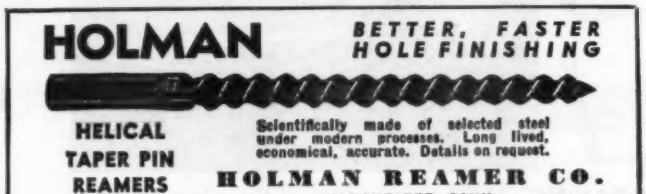


HAVE YOU *Tapped* THIS SOURCE OF SUPERLATIVE THREADING?

Your *Threadwell* distributor was selected because he proved himself ready and able to give personal and efficient attention to your tap requirements.

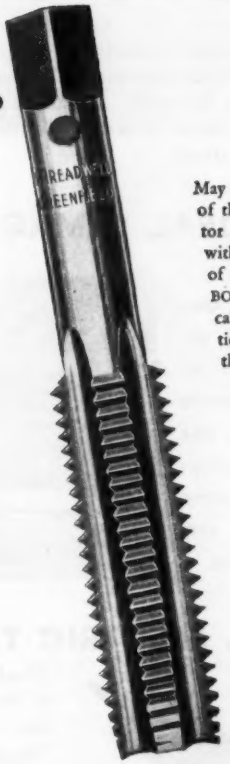
He, in turn, selected *Threadwell Taps* because their makers proved equally ready and able to give *personal attention* to all orders — and because he knows that every *Threadwell Tap* he recommends has the accuracy and stamina to give superlative threading performance plus these added and exclusive *Threadwell* advantages.

Color "i-dot-ification" — type of tap instantly identified by *red* dot for cut thread, *white* dot for commercial ground, *blue* dot for precision ground.

The "tap-capsule" in which every *Threadwell* ground thread tap is individually sealed and protected but visible for size and style without unwrapping.

Greaseless rust-proofing — always shining, always clean, always easy to handle.

Polished flutes which speed chip removal and help prevent breakage.



May we send you the name of the *Threadwell* distributor nearest you, together with a complimentary copy of the new *Threadwell* TAP BOOK, chock-full of practical, down-to-earth information on how to cut better threads at lower cost?

DISTRIBUTORS IN LEADING INDUSTRIAL CENTERS THROUGHOUT AMERICA

EXPORT STOCKING DISTRIBUTORS

CANADA *Bridge Machinery Co., Montreal*

ENGLAND *Skylux Ltd., London*

and

John H. Graham and Co., Inc.

THROUGHOUT THE WORLD

Threadwell

SINCE 1902

"TAPS OF DISTINCTION"

THREADWELL TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.

A PRECISION TOOL

Accepted as Standard

BY LEADING MACHINE SHOPS

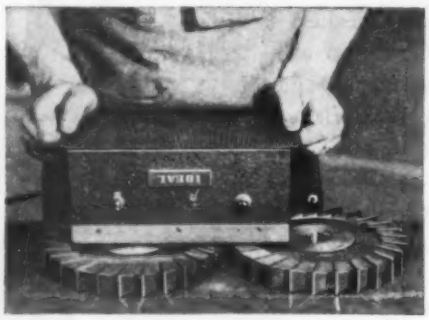
IDEAL
LIVE CENTERS

4 Interchangeable Inserts for all kinds of centered and uncentered work.

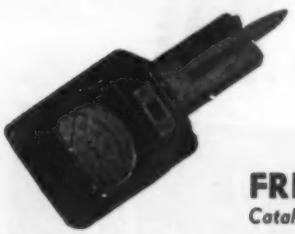
IDEAL's precision-built Live Centers permit heavier loads, and deeper cuts at higher speeds because they rotate with the work. Exclusive with Ideal are the four interchangeable inserts. Centers with Morse tapers carried in stock.

IDEAL DEMAGNETIZER

A single pass across the demagnetizer removes metallic dust, flakes, fine chips, etc., clinging to the cutting edges of your tools and dies.



IDEAL ELECTRIC TACHOMETER



Checks RPM instantly. Used as a "Hand Type" or with generator separated from meter as "Separable Type". Two Ranges —0 to 2500 RPM and 0 to 5000 RPM.

FREE: *Machine Tool Accessories Catalog gives information on these and many other time-saving tools.*

IDEAL *Sycamore*
★ IDEAL COMMUTATOR DRESSER CO ★

1057 Park Ave. **Sycamore, Ill.**

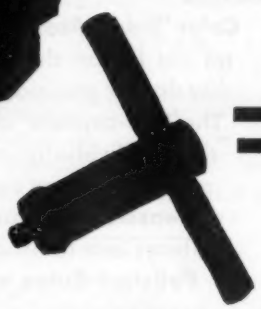
Sales Offices in all Principal Cities
In Canada: IRVING SMITH LTD., Montreal, Quebec

These exclusive features give
MOTOR TOOL (Ball and Roller Bearing) **LIVE CENTERS**
EXTRA LONG LIFE

In addition to standard morse taper sizes (1 to 7, inclusive) carried in stock . .
Precision-built MOTOR TOOL LIVE CENTERS are constantly being developed by our engineering staff for numerous SPECIAL machining operations. Spindles, heads, tapers and points are designed to exactly fit the work to be done.
Whatever your needs—standard or SPECIAL—consult with our engineers. Know the speedier production and greater economy of using MOTOR TOOL LIVE CENTERS —the centers that will not burn out or break down no matter how long or how tough the job.
LOCK FOR REDRESSING POINT WITHOUT DISMANTLING.
NEEDLE BEARING FOR TRUE RUNNING AND PREVENTION OF CHATTER.
CORK THRUST PAD COMPENSATOR FOR HEAT AND EXPANSION OF WORK.
HEAVY DUTY BALL BEARING FOR GREATER THRUST LOAD.
HEAVY-DUTY ROLLER BEARING FOR GREATER RADIAL LOAD CAPACITY.
GREASE SEAL TO RETAIN LUBRICANT AND KEEP OUT FOREIGN MATTER.
LARGE SPINDLE FOR STURDINESS AND GREATER LOAD.
BALL NOSE MALE HEAD
BALL NOSE FEMALE HEAD

MOTOR TOOL MANUFACTURING CO.
METAL CUTTING TOOLS
7787 CORTLAND AVENUE · DETROIT 4, MICHIGAN
Make it a Rule to Call Motor Tool

Almond Drill Chuck



The Original Manufacturers of Drill Chucks

●

As Pioneers in their field, ALMOND THREE-JAW DRILL CHUCKS have played an important part in machine tool development. They were the first to be placed on the market more than seventy years ago.

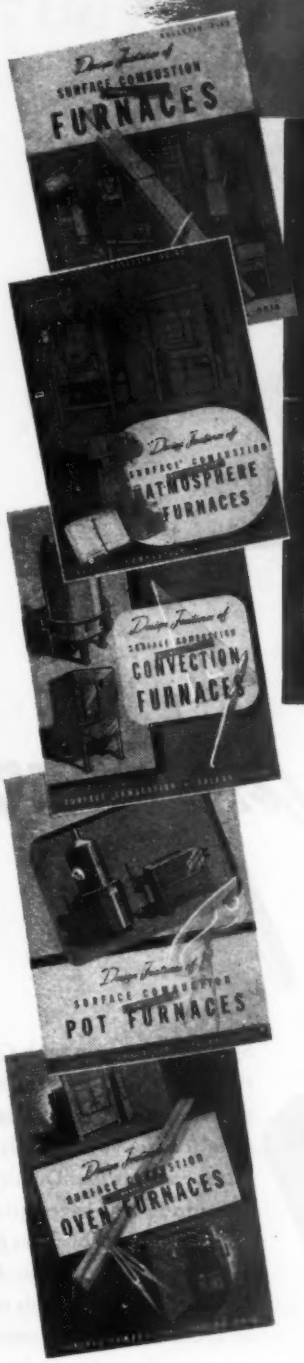
Types and sizes are available to fit all machine tools and portable drills.

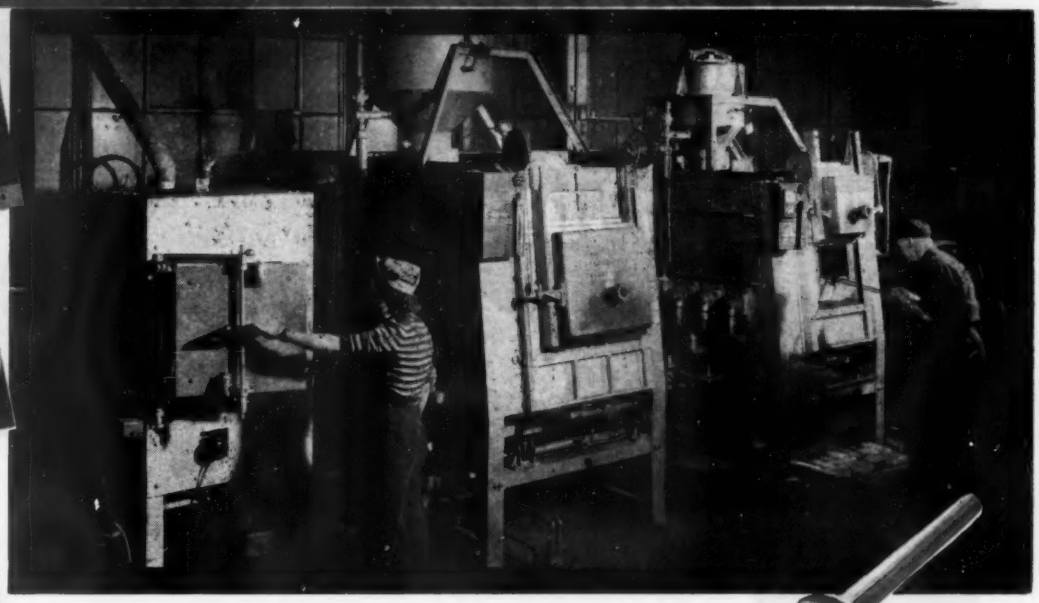
Write for complete information.

T. R. ALMOND MFG. CO.
ASHBURNHAM, MASS., U.S.A.

TOOL ROOM FURNACE REQUIREMENTS

should govern selection





● A spanner wrench won't tighten pipe—it wasn't designed for that purpose. Furnaces, like tools, are best suited for the operations for which they were designed.

One group of furnaces will not meet the heat treating requirements of every tool room. The tools—the steels—the uses all differ; therefore, the best for one is not satisfactory for all.

Don't accept a pre-selected group of furnaces—pick the combination that best meets the requirements. Surface Combustion offers over thirty types of Standard Rated Furnaces to select from and have engineers available in principal cities to assist in analyzing the needs and selecting the equipment.

Ask for these Illustrated Bulletins:

I-43, Standard Rated Design Features
OG-43, Oven Furnaces
AG-43, Atmosphere Furnaces
PG-43, Pot Furnaces
CG-43, Convection Furnaces

The Heat Treater's Helping Hand

'Surface'

SURFACE COMBUSTION • TOLEDO 1, OHIO

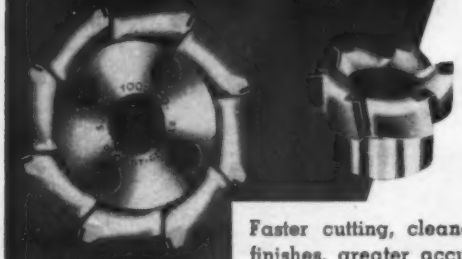
Standard and Special Industrial Furnace Equipment For:
Forging, Normalizing, Annealing, Hardening, Drawing, Carburizing, Nitriding and Heating. Special Atmosphere Generators. *Write for Bulletins.*

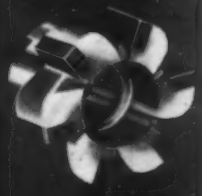
HERE'S

SUPER

CARBIDE TIPPED **Economy** FOR YOUR

FACE AND END MILLING JOBS!





Let us send you this literature giving complete details and prices of Super Shell End and Face Mills

Faster cutting, cleaner cutting, finer finishes, greater accuracy . . . these carbide tipped efficiencies are now available for your face milling and shell end milling jobs. For Super Tool engineers have developed this new line of Carbide Tipped Shell End and Face Mills!

Here's another step forward in carbide tipped standardization! These cutters are available in standard sizes, both for non-ferrous materials and in the Super NEGRAK (negative rake) type for cutting steel. They are manufactured on a production basis and the shell end mills may be purchased in the left-hand type at standard prices. When you buy a Super Carbide Tipped Face Mill or Shell End Mill, you enjoy economies that start with the first cost and continue through every operation of the cutter's exceptionally long life.

Super Carbide Tipped Shell End Mills and Face Mills are worthy additions to the line of Super Carbide Tipped Tools —tools that are setting new records of performance and economy on all types of cutting jobs the country over. Write TODAY for details of the complete Super Tool line including these new Super Shell End and Face Mills.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

Selected for SERVICE

Speed your output with Criterion Diamond Tools. The kind of service they give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

"Boys, let's put our heads together and see how much paper and paper board we can save!"

THAT'S the spirit. That's what we've all got to do to lick this problem of getting enough paper and paper board for Army and war-production use.

Every company has got to organize a Paper Conservation Committee and tackle the problem with all the gumption and the brain power at their command.

Paper inventories must be checked with the idea of eliminating peacetime extras. From stationery to board containers, every paper item must be examined to see in what way each company can use less paper.

Functional packaging must be the order of the day.

Sure, you have followed all the government directives on the subject. Even made cuts of your own. But, frankly, that isn't enough. Every time another ship leaves an American port loaded with paper-wrapped war supplies, the problem becomes tougher.

And it's up to you to join with the rest of industry to lick it. The War Advertising Council and the War Production Board have prepared a brief list of suggestions to help you. But you know your own business. You know how you can use less paper. ***It's up to YOU!***

TO GET MORE PAPER FOR . . .	USE LESS PAPER THESE WAYS
Blueprints for battleships	Eliminate slack fills.
"K" ration containers	Increase units per case to the maximum practical.
Signal Corps radio sets	Reduce separators to shoulder height.
Containers for shells	Eliminate carton liners if possible.
Gas mask canisters	Eliminate individual cartons wherever possible.
Disposable gun covers	Reduce weight of containers whenever compatible with safety.
V-mail envelopes	Do away with all unnecessary overlapping.
Blood plasma boxes	Set up a Paper Conservation Board in your plant.

This advertisement prepared under the auspices of the War Advertising Council in co-operation with the Office of War Information and the War Production Board.

Let's All Use Less Paper

Space for this advertisement contributed by American Machinist

35% MORE HOLDING POWER IN WALKER PERMANENT MAGNETIC CHUCKS

The greater holding power of this new line of WALKER Magnetic Chucks is due to a WALKER-developed method of energizing and a design which provides finer pole divisions. Only 3/8" between Pole Divisions. Top plate is totally magnetic, contributing to its superior holding power. This is the result of over 50 years experience in the design of Magnetic Chucks. Other advantages achieved are retention of holding power over an indefinite period of time and a much greater effective magnetic area.

WALKER Permanent Magnetic Chucks fulfill all the rigid requirements of the WALKER Standard of quality. Several Standard sizes of WALKER Permanent Magnetic Chucks are now available for immediate delivery. Adaptations of chucks of this type can also be furnished promptly to meet the requirements of special applications.

This new line supplements the regular line of Walker Electric Magnetic Chucks.

Send for literature describing the complete line of WALKER products.

O. S. WALKER CO., Inc., WORCESTER, MASS., U. S. A.

"BUZZER" HIGH SPEED *Gas* FURNACES

Attain High Temperatures

without BLOWER or POWER
. . . just connect to gas supply

FULL MUFFLE FURNACES . . . reach temperatures of 2400° F. without blower or power. Ideal for heat treating high speed and Alloy Steels. Also available in Bench Models.

ATMOSPHERIC POT HARDENING FURNACES . . . tangentially-fired to assure even heat up to 1650° F. are used for Salt, Cyanide and Lead Hardening. Also adapted for Melting Aluminum.

Send for the complete "BUZZER" Catalog

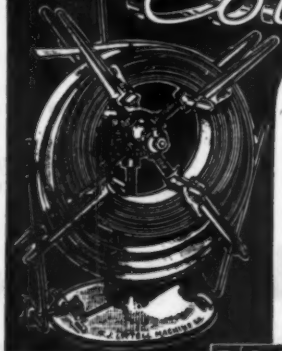
CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

Write for Bulletin

STEVENS MILLING MACHINE VISES
5 in., 6 in. and 7 in. sizes
All parts Interchangeable
JOHN B. STEVENS INC.
474 Canal St., New York 13, N. Y.

Let's
BACK THE ATTACK
By Buying WAR BONDS

Coil Stock
feed it faster
with **LITTELL**
AUTOMATIC CENTERING
REELS



WAR production is rolling along faster where roll stock is uncoiled with LITTELL Automatic Centering Reels. They insure a free-flowing loop of material. Coil capacities up to 20,000 lbs.

Littell also makes a complete line of other press-room equipment—Roll, Dial, Magazine and Hopper Feeds—Straightening Machines, Air Blast Valves, Pres-Vac Safety Feeders, etc. What are your requirements?

ASK FOR BULLETINS

Littell No. 3 Reel. Capacity 300 lbs.

F.J. LITTELL MACHINE CO
4169 RAVENSWOOD AVE CHICAGO ILL

DRY SMALL PARTS QUICKLY and ECONOMICALLY with BARRETT CYCLONE CENTRIFUGAL DRYERS

The Barrett Centrifugal Dryer — efficient, self-contained, and compact is built in several sizes.

• The Barrett Parts Drying Process centers around a method of creating a guarded cyclone.

In operation, parts to be dried are placed in a well ventilated motor driven rotating basket. Free liquid is immediately thrown off by centrifugal force and any moisture remaining on parts is absorbed in the shortest possible time by the large volume of expanded air continually forced over and through the contents. Provision is made for heating and expanding, also boosting the flow of incoming air to assure faster absorption of moisture. With the large exhauster provided, heated air is not always required.

Direction of basket rotation can be quickly reversed which will change position of the load and accelerate drying. Baskets are available in shapes which experience has shown to be most effective for handling various classes of work.

It will pay to investigate the advantages offered by Barrett Centrifugal Dryers on your work.

Full Details of the Barrett Cyclone Dryer Sent Promptly on Request.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

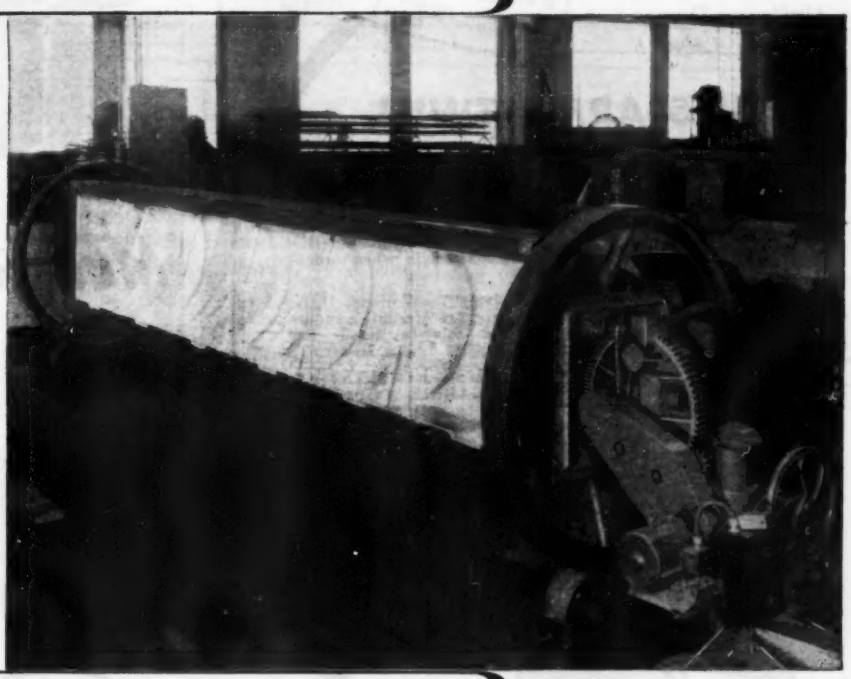
C-F POSITIONERS

Save 72 Lifts

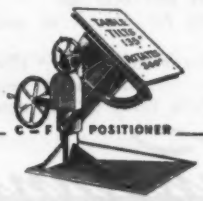
The Norberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

Now, the C-F Positioner moves the weldment through the routine positions under a push button control saving 24 hours crane time, 24 hours crane operator's time, and the same of both a sling man and the welder's time per weldment . . . in other words saving three man-days and one crane-day on each header produced.

C-F Positioners come in 6 sizes—capacities to 30,000 lb. All are pedestal mounted, rotate 360° and tilt to 135° beyond horizontal.



Write for Bulletin WP-22



CULLEN-FRIESTEDT CO., 1313 S. Kilbourn Ave., Chicago 23, U.S.A.

THE ANSWER TO A PRODUCTION PRAYER

Buhr combines a fixture and bushing plate to drill 6-¼" holes in right and left hand parts of an aircraft turret part.

Fixed center drill head has vertical adjustment in spindles.

Send blueprints to **Buhr** for suggestions and recommendations to solve your problems.

Specialists in multiple spindle drilling, boring, reaming, tapping equipment.

BUHR MACHINE TOOL COMPANY

ANN ARBOR MICHIGAN

For Better Uniforms Demand These Labels!

ARMY TWILL BY REEVES SANFORIZED* MADE TO GOVERNMENT SPECIFICATIONS

REEVES Glengarrie POPLIN

REEVES ARMY TWILL SCORES A HIT!

With men who handle machinery, it's stamina and wear that count in uniforms. So specify this famous fabric when ordering your uniforms.

Reeves Army Twill passes U. S. Govt. tests for strength, endurance and color-fastness. For fabric vitality it's a leader.

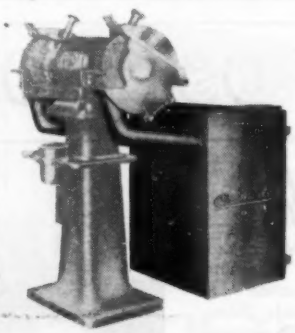
For matching shirts, GLENGARRIE POPLIN is equally popular. Both fabrics available in favorite colors — are Sanforized* against shrinking.

* Fabric shrinkage not more than 1%. (U. S. Government Test CCC-T-191-a)

See your nearest dealer for uniforms, sport and work clothes made from these famous fabrics, or write for leaflet to:

OVER 60 million yards of Reeves Army Twill sold to the U.S. Army

REEVES BROTHERS, INC.
54 WORTH STREET NEW YORK



MEET A REAL SUCKER!

The Cincinnati AIR MASTER sucks up dust and grit right off your grinder and buffer wheels—and does it right at the moment these destroyers of health and machinery fly off the wheels.

No need to jeopardize the health of your employees working at grinding or buffing—no need to shut down expensive machinery and lose valuable time due to breakdowns caused by flying grit and dirt getting into sensitive moving parts and bearings.

Install the Air Master at each buffer and grinder.

Fully self-contained . . . efficient, rugged, dependable . . . a size for every grinder or buffer. *Write today for full details.*

The Cincinnati

ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

The Cincinnati Electrical Tool Co. 2676 MADISON RD.

CONTRACT WORK

TOOLS • DIES • JIGS • FIXTURES • MOLDS • STAMPINGS • FORGINGS • SPECIAL MACHINERY • DEVICES • PARTS • SCREW MACHINE PRODUCTS • CASTINGS

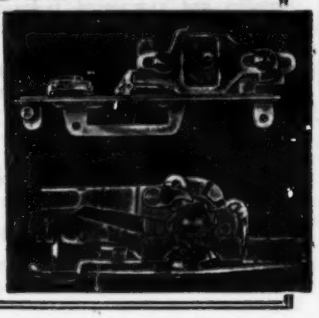
ADDITIONAL FACILITIES FOR CONTRACT MANUFACTURING

Hand screw machines up to 1½ dia.
Turret lathes up to 15" dia.
Milling machines
Engine lathes
Bench lathes
Drill presses
DoALL contour cutting machine

RELIANCE MACHINE & MFG. CO.
30 Irving Place, New York, N. Y.
established 1922

STAMPINGS AND ASSEMBLIES

"GREATER SAVINGS WITH GREIST"



We can make short or long runs in any metal. Our modern equipment and methods, backed by 50 years of experience, are your guarantee of satisfaction. We are also fully equipped to make

SCREW MACHINE PRODUCTS
TOOLS, DIES, JIGS, FIXTURES

Quality work by skilled mechanics is assured. Send your blueprints or samples today.

THE GREIST MFG. CO.
546 BLAKE ST. NEW HAVEN, CONN.

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER

STEEL PRODUCTS CO.
1103 E. 23rd St. INDIANAPOLIS, IND.

CONTRACT WORK—

We can build machines and parts, special tools and fixtures of all kinds to your specifications and design. Skilled workmen and modern equipment are your guarantee of satisfaction. The design and building of wire and ribbon stock forming machines are our specialty.

We solicit your blueprints or samples for quotation. No obligation of course.

THE A. H. NILSON MACHINE COMPANY
Bridgeport, Conn.

WIRE AND METAL SPECIALISTS
in round, flat, square and special shaped wire in all metals.
LARGE PRODUCTION CAPACITY
Plating and finishing.
EASTERN TOOL & MFG. CO.
BLOOMFIELD, N. J.

TANK AND SHEET METAL WORK

We are equipped to manufacture to your specifications tank work, such as storage tanks, pressure tanks, etc. Our welders are experienced in welding steel, stainless steel, Monel metal and Everdur; also brazing of all descriptions. They are certified for welding under the ASME Code Unfired pressure vessels. We also have certified Navy Aeronautical welding under certain specifications. Send your blueprints for prompt quotations.

BOWSER, INC.
1302 E. CREIGHTON FT. WAYNE 5, INDIANA

√ Check this Page . .

when you are looking for extra manufacturing facilities to meet war-production schedules. Leading concerns advertise their facilities for contract work here, and you can save *time* and *cost* by contacting them.

If *you* do contract work—and have facilities available — feature your services on this page where more than 23,000 AMERICAN MACHINIST subscribers — active buyers in metal-working — will see your advertisement.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

PLANT EMPLOYING 200 PEOPLE HAS PRODUCTION TIME OPEN

- CENTERLESS GRINDERS
- TURRET LATHES
- MILLERS SUPPORTING EQUIPMENT
- SHAPERS

Over 200 Machine Tools

BERGEN MACHINE & TOOL CO., INC.
189 Franklin Ave., NUTLEY 10, N. J.

PRECISION FORM GRINDING
Specialists in grinding Circular and Flat FORM-TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.
Send Prints for Quotation and Delivery
J. & S. TOOL CO.—477 Main St. — E. Orange 1, N. J.
(Makers of J.&S. Radii & Angle Dressing Tools)

SEARCHLIGHT SECTION

TO ENGINEERS WHO WANT MORE "ELBOW ROOM"

We are a well-known, medium-sized, Northern Indiana manufacturer of industrial equipment and machinery. Have been in business continuously since 1908.

Our prewar business made us the leader in our field . . . Our wartime business is booming full tilt . . . Our post-war business position will be strong because of a number of new and unusual engineering developments that will greatly enlarge our market possibilities.

Large volume of research, design, and developmental work demands the addition of six capable, progressive, graduate mechanical engineers to key positions on our permanent staff. Men selected will have unusual creative opportunities. Metal trade or machinery experience desirable.

Also excellent opportunities for sales-minded engineers and experienced technical writer.

Write giving availability and full details about yourself in first letter.

P-812, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

SUPERINTENDENT

for

Brown & Sharpe Screw Machines

Must have knowledge and be thoroughly experienced in cam layout and processing.

Excellent Post War Future with reliable Detroit Company.

Salary commensurate with ability.

Address P.O. Box 125
Alfred St. Station, Detroit 1, Mich.
Must comply with WMPC

(POSITION VACANT)
IN CALIFORNIA—DRAFTSMEN AND DESIGN ENGINEERS

Desiring permanent position with well-established manufacturer of small high-speed machines. Leader in industry with future development program always in progress. Must have good background in design of small intricate production parts. If so qualified and interested give background. (Apply:

P-811 AMERICAN MACHINIST
68 Post Street San Francisco 4, Calif.

WANTED
CHIEF INSPECTOR

With background of experience in planning and organizing daily work. Thorough knowledge of all phases of machine parts and casting inspection. Old established concern with excellent post war prospects

P-796, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED
SUPERINTENDENT

for Grinder Division. Landis, Norton, centerless, vertical and horizontal Hones. Must be fully qualified on all types of grinding and possess organizational and supervisory qualifications. Old established concern with excellent Post War prospect.

P-795, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED
ASS'T. CHIEF INSPECTOR

Must have background of machine parts and casting inspection along with supervisory qualifications. Established concern with excellent Post War prospect.

P-794, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED — TOOLMAKER

who has had enough experience to take charge of tool room on special machine tools, jigs, fixtures, and gages, for our own plant. Excellent post-war opportunity for man who desires to get connected with a progressive concern established in 1933. Factory located on beautiful Lake Shore Drive, in southwestern Michigan. Give all details and salary expected in first letter.

P-701, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

MECHANICAL ENGINEER—Draft exempt to supervise complete plant. Must have experience in production of precision tools and aircraft engine parts, intimate knowledge of metallurgy including gas carburizing and heat-treatment of aircraft steels and high speed. Knowledge of wire drawing practice and manufacture of wire drawing machines and equipment for air corps wire. Must have supervisory experience and proven ability in the above lines. Excellent salary and good opportunity for post war. P-814, American Machinist, 330 W. 42nd St., New York 18, N. Y.

MECHANICAL ENGINEER wanted. Industrial Products manufacturer needs man with good general knowledge of machine development and design and related problems. Permanent position with long established, progressive, financially sound organization with considerable post-war business already on hand. In reply please give experience, record, age, and other pertinent information. Appropriate WMC clearance required. Strict confidence assured. Address P-815, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

EMPLOYMENT SERVICE

SALARIED POSITIONS—This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details, R. W. Bixby, Inc., 266 Delaware Bldg., Buffalo, N. Y.

POSITIONS WANTED

PRODUCTION EXECUTIVE desires better opportunity for advancement. Young, aggressive, experienced. PW-816, American Machinist, 330 West 42nd St., New York 18, N. Y.

PERMANENT POSITION wanted as an assistant to a busy executive or as a factory manager by a 47 year old, aggressive, mechanical engineer with excellent shop and organization experience and wide knowledge of production methods, processing and tool design. Position must afford plenty of responsibilities. Married, one son and able to locate on short notice. Record and references on request. Perfect knowledge of Russian, French, and German languages. PW-806, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MANUFACTURING EXECUTIVE or Sales Engineer 15 years direct association with Automatic and Hand Screw Machines as Operator, Consultant and Shop Manager over large battery of Automatics. 10 years supervisory experience in Time Study, Motion Analysis, Inspection and Plant Layout. Past two years and presently employed as Chief Process and Development Engineer in large plant engaged in Aircraft work. Age 46 A-1 References. PW-817, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

REPRESENTATIVE WANTED

REPRESENTATIVES AND DISTRIBUTORS wanted. A nationally known manufacturer of metal cleaning machinery, solvents, and metal cleaning compounds, has open territory. Desires alert, aggressive representation. Direct mail and Trade paper advertising assures excellent opportunity now and post war. Write stating territory covered, background and present connections. RW-818, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

REPRESENTATIVE AVAILABLE

MECHANICAL EXECUTIVE. Twenty years selling experience. Two years in charge of Perishable and Critical Tool Divisions of War Production Board. Have rendered service to three thousand Tool and Production Shops in the Detroit area: Available to represent outside Manufacturers. Will consider special assignments on a retainer basis or a full time connection. Can handle any of your problems. Priorities, Sales, Placing of Contracts, Expediting, and make your Post War Connections. RA-819, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED

WANTED—two high lift industrial fork trucks. Capacity one ton or more. Any type. Reply W-820, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

BUSINESS OPPORTUNITIY

FOREMAN, INSTRUCTOR, MACHINIST. Age 43, 28 years experience on all makes turrets, Clevelands, Brown and Sharpe seeks position or partnership with postwar future. BO-821, American Machinist, 330 W. 42nd St., New York 18, N. Y.

CONTRACT WORK

MANUFACTURING FACILITIES WANTED: Forging, cold heading or punch press shop wanted to make several million pocket knife bolsters for us. Write for samples. Union Cutlery Co., Inc. Olean, New York.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Fee Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N. W. Washington, D. C.

- We want to

PURCHASE

complete going plants and products for post-war manufacturing.

- We have $500,000.00 to use for this purpose.
- We will be pleased to communicate with sincere, interested parties.
- We are not interested in speculative propositions.
- Address all communications to:

PAUL ZAKROFF

VICTORY MACHINE PRODUCTS CO.

5820 SO. WOOD STREET
CHICAGO 36, ILLINOIS

FOR SALE

Or post war connection, small jobbing shop in Texas Coast Area.

BO 809 AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED

Additional Wanted Advertising on Page 276.

NEW INVENTIONS WANTED

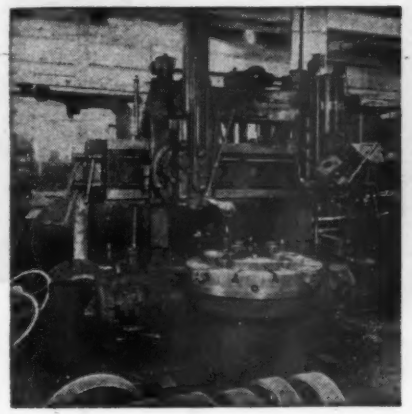
Mechanical and electrical devices for post-war manufacture and sale. Either new ideas, or improvements upon present methods.

P. O. Box 217, Denville, N. J.

IMMEDIATE DELIVERY

"FALK" for DEPENDABILITY in Rebuilt Machinery

48" GISHOLT VERTICAL BORING MILL



ANGLE BENDING ROLL

Bertsch 3" x 3" x 3/8".

BORING MILLS

Vertical, 48" Gisholt.
Vertical, 52" Colburn.
Vertical, 100" Niles-Bement-Pond.
Vertical, 42" "New Era" Bullard.
Vertical, 60" Colburn.
Horiz. 30" Landis-Rochester.
Floor Type—Floor Plate 72" x 120".

COMPRESSORS

Ingersoll Rand 100' Free Air.
15 hp. Direct connected Motor Drive A.C. 60 cyc.

RADIAL DRILLS

3' Arm Dreses 9" Rd. Col.
4' Arm Cincinnati Bickford.
5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cincinnati Bickford, air clamp.
6' Arm 15" Col. American.
7' Arm 15" Bickford.

MILLING MACHINES

No. 5 Cincinnati, High Power, Plain, S.P.D.
No. 4 Cincinnati, High Power, Plain, S.P.D.
No. 4 Cincinnati, High Power, Plain, S.P.D.
No. 3 Cincinnati, High Power, Vertical.
No. 2 Cincinnati, High Power, Plain.
No. 2 Cincinnati, Motorized, Pyramid Col.
No. 2 Brown & Sharpe, Plain (10).
No. 1½ Brown & Sharpe, Plain (2).
No. 1½ Valley City Universal, Cone Dr.
No. 1 Kempsmith Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
No. A Gooley & Edlund Motorized Prod.
No. 12 P & W Lincoln Type Production (2).
No. ½ Van Norman Univ. Duplex, Belt Dr.
No. 00 Bickett Hand Miller.
No. 0 Bickett Vertical Bench Miller.
Ames Precision Universal Bench Mill.
P & W 2" Duplex Spline Miller.
Hall Planetary Thread Miller 24"
No. 8 Lees Bradner Thread Miller.

PLANERS

120" x 72" x 35' Betts, 4 Heads, M.D.
72" x 72" x 18' Pond Heavy Pat., 4 Heads.
48" x 48" x 12' Putnam Heavy, 4 Heads, M.D.
30" x 30" x 12' American M.D., 2 Heads.
30" x 30" x 10' Cincinnati Heavy Pat., 2 Hds.
26" x 26" x 8' Gray, Belt Dr., 1 Head.
24" x 24" x 6' Cincinnati, Belt Dr., 1 Head.

PLANER - SHAPER

20" x 20" x 36" Niles, B.P., M.D.

SHAPERS

7" Rhodes Horiz. High Speed, Belt Dr.
16" Gould & Eberhardt (Old Pattern) Back Geared 4 step cone, with Vise and c/s. Good condition, $600.00.
16" W. P. Davis motor driven B.G.
24" Gould & Eberhardt High Duty M.D.
26" Cincinnati Triple Geared Belt Dr.

GRINDERS

‡ 13 Brown & Sharpe Universal and Tool.
12" Persons-Arter Rotary Surface Grinder.
16" Heald Rotary Surface Grinder.
12" Heald Rotary Surface Grinder also equipped with 9" Dia. Permanent Magnetic chuck.
‡2 Brown & Sharpe 10" x 30" Univer. Cylindrical Grinder.
14" x 36" Pratt & Whitney Vertical surface Grinder B.B.
‡ 2 Brown & Sharpe 6 x 18 Surface Grinder, Belt, with 6½ x 18 Magnetic Chuck Ser. 7003.
‡ 2 Cincinnati Centerless Grinder, Filmatic.
24" x 136" Landis, Univ. Cylindrical Grinder.
‡ 12 Greenfield Hydraulic Internal Grinder.

GEAR CUTTERS

‡ 612 Fellows 36" Gear Shapers, (2)
24" Schuchart & Schulte.

BRAKE

‡ 203 Dries & Krump Apron Type, Motor Dr., 10' x 11 Ga.

AUTOMATIC

Davenport Model "B" High Speed, 5 spindle 9/16" cap. Threading spindle, complete, perfect condition.

LATHES

LeBlond 14 x 6 Toolroom Lathe, Collets, Taper, Chucks.
Rockford 16 x 6 Toolroom Lathe, Taper, Chucks, M.D.
LeBlond 21 x 8 High Duty, Taper, Chuck, M.D.
LeBlond 21" x 16' High Duty, Taper, Chuck, M.D.
Schumaker & Boye 24" x 10" QCG, Taper, Chuck, Belt Dr.
Putnam 26 x 12 Heavy QCG, arr. for M.D.

THIS IS A PARTIAL LISTING OF OUR STOCK. SEVERAL HUNDRED ADDITIONAL ITEMS IN STOCK. SEND US YOUR INQUIRIES.

Buy from Stock
MACHINERY
Tel. Main 6347-6348

FALK
MACHINERY CO.,

18 WARD ST.
MERCHANTS
ROCHESTER 5, N.Y.

READY TO SERVE THE POSTWAR NEEDS OF AMERICAN INDUSTRY

When American manufacturers were suddenly confronted with the task of producing the munitions of war . . . the used machine tool dealers were organized to play their part in mobilizing the necessary machine tools.

Today America's used machine tool dealers are equally ready to aid in demobilizing war machine tools and distributing them back into postwar industry.

To this end, MDNA dealer members are planning to serve the machine tool users as follows:

1. They will make every effort to obtain complete details and proper listing of machine tools released by the Government when their need in the war effort has ended.

2. Through their technical knowledge and experience they can use this information to select and recommend the machine tool most suitable for the particular production problem.

3. There will be an interchange of information among the members of the Association so that machine tool buyers in any locality, who are serviced by MDNA dealers, can benefit from the combined information of the MDNA dealers.

The machine tool buyer should keep in close contact with MDNA dealers and acquaint them with his needs from time to time so that they may be better able to serve his postwar needs and production problems.

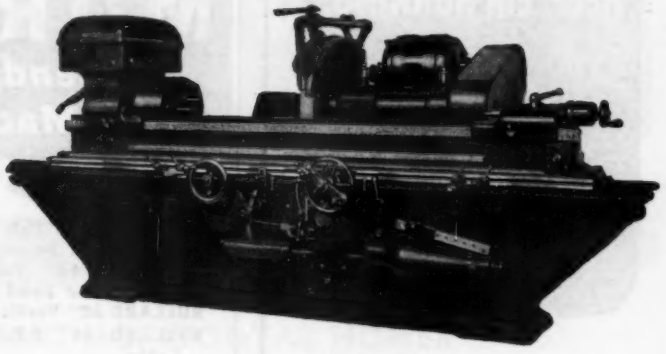
MDNA
MEMBER

The MDNA insignia is intended as a trademark of quality. Its appearance in the advertising of an MDNA dealer member testifies that he subscribes to and practices in his business relations the Code of Ethics adopted by Machinery Dealers' National Association.

MACHINERY DEALERS NATIONAL ASSOCIATION

20 NORTH WACKER DRIVE CHICAGO (6) ILLINOIS

HILL-CLARKE
Modernized
CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH



SIZES AVAILABLE

10x28	10x50	14x72	16x72
10x36	14x50	16x50	18x96
			18x168

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke Patented Multiple V-Belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO. CHICAGO U.S.A.

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD — CHICAGO 6, ILL.

GEAR MACHINERY

9' Pratt & Whitney Gear Grinder, M.D.
11" Gleason Bevel Gear Generater
No. 64 Fellows Gear Shaper, M.D.
No. 6 Fellows Gear Shaper
Cimatool Gear Chamfering, M.D.
Lees-Bradner Gear Grinder

LATHE — TURRET LATHES

6" x 6¾" Goss & DeLeeuw Chucking Machine
3" x 36" Jones & Lamson Turret Lathe, bar feed
1¾" Gridley Model F 4-Spdl. Auto., M.D.

SHAPERS — PLANERS

30" x 30" x 8' Woodward & Powell Planer, Rev. M.D.
36" x 48" x 12' Cinc. Hypro Planer, 4 Hds.
18" x 18" x 4' Whitcomb Planer

MILLING MACHINES

4¼ x 12" Pratt & Whitney Thread Miller
#25B Defiance Hor. Bor. Mill—1941 Model
#3 KM Kearney & Trecker Vertical—1940
#2 KM Kearney & Trecker Plain—1940
#2 Brown & Sharpe Plain

GRINDERS

10" x 120 Norton Grinder, M.D.
#10 Brown & Sharpe Pl. Grinder, M.D.
No. 3 Oesterlein Cutter & Tool Grinder

MISCELLANEOUS

21-SA Cochrane-Bly H.S. Saw
No. 171 Bliss Stiles Spru Cutter
New Delta Drilling Equipment

WIGGLESWORTH MACHINERY CO.
203 Bent St., Cambridge, Mass.

PRACTICALLY NEW PUNCH PRESSES

2—No. 86A Bliss straight side reducing. 30" x 30" bed area, 6" crank, single geared, air clutch, twin steel drive gears on crank, Timken bearings, 8 station dial feed. One has 10" stroke, 21" shut height, the other 12" stroke, 20" shut height. Motor drive.

4—No. 85A Bliss straight side reducing. 30" x 30" bed area, 5½" crank, double geared with twin steel drive gears on crank, air clutch, Timken bearings, 8 station dial feed. One has 15" stroke, 20" shut height; two have 22" stroke, 23" shut height; one has 24" stroke, 22" shut height. Motor drive.

1—600 ton, No. 25A Bliss knuckle joint coining or embossing, extra width, 4" stroke, 22½" shut height, 8 station dial feed, motor drive.

1—No. 21 Bliss OBI, 6" stroke, 19" shut height, single geared, 8 station dial feed, motor drive.

2—No. 21½ Bliss OBI, 8" stroke, 20½" shut height, single geared, 8 station dial feed, motor drive.

1—No. 39B Bliss horning. Elevating table, back geared, 2" stroke, 6 station dial feed, motor drive.

The above Presses were bought in 1940 and 1941.

OTHER PRESSES

No. 6 Toledo OBI 3" stroke
No. 6 Waterbury Farrell gap frame, 1½" stroke
No. 33 Consolidated arch frame, 3" stroke
No. 53 Toledo straight side, 3" stroke
No. 2 Standard screw type, 0" to 12" stroke
28", No. 71 Swaine double crank, 1" stroke
34", No. 174 Consolidated double crank gap, 3½" stroke, roll feed.
51" Ferracute No. SG84 double crank, 4" stroke.
108", No. 796¼D Toledo double crank toggle drawing, 22" & 33" strokes, 201,000 lbs.

MILES MACHINERY CO., SAGINAW, MICH.

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MONA MEMBER
JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

4' Universal Radial Drill, B.D.
26" x 14' Bridgeford Geared Head Lathe
#14 Cochrane-Bly Vert. Miller & Shaper, M.D.
12" x 32" Landis Universal Grinder
24" Gisholt Turret Lathe, 6¼.
26"-24"-32" Shapers.
10' Bridgeport Knife Grinder.
36" Morton Draw Cut Shaper.
No. 3 Catlin Keyseater 23" x 2", M.D.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

LARGE METAL PLANER

Niles 12' x 12' x 25' Double Housing Planer, Two Heads on Rail, Two Side Heads, Two-Section-Bed, Arranged Motor Drive — AVAILABLE IMMEDIATELY.

ALSO MANY OTHER TOOLS

ALEX ZEEVE & COMPANY
2269 Woolworth Building New York 7, N. Y.

KEEP 'EM RUNNING!

Every machine listed in this column is in our warehouse at press time.

●

66" NILES-BEMENT-POND Boring and Turning Mills, M.D.

4½" Bar No. 33 LUCAS Horizontal Boring Milling and Drilling Machine, M.D.

#0 FOSDICK Horizontal Boring, Drilling & Milling Machine, M.D.

4' HAMMOND Hi-Speed Sensitive Radial Drill, M.D.

33" x 9" GOULD & EBERHARDT Spur Gear Cutter

3' WESTERN Plain Radial Drill

7' AMERICAN Universal Radial Drill, M.D.

18/27" Gap Bed Lathes, M.D.

42" PUTNAM Double End Car Wheel Lathe, M.D.

#3-B MILWAUKEE Plain Miller

#2 CLEVELAND Plain Miller

#10 NILES Vertical Milling Machines

#6 BECKER Vertical Milling Machine

30"x30"x10' NEWTON Slab Miller

12" Wm. SELLERS Slotters

20" SELLERS Crank Slotter, M.D.

12"x12" ACME Power Hack Saw, M.D.

48"x48"x24' N.B.P. Heavy Planer, Two Rail, One Side Head, M.D.

48"x48"x20' PATCH Planer, 4 heads, 230 volt D.C. Rev. M.D.

24"x24"x6' WHITCOMB Planer, 230 volt D.C. Reversing M.D.

42"x48"x12' SIMMONS Openside Planer, 230 volt D.C.

#3 WARNER-SWASEY Turret Lathes, 3⅛" bar capacity

#1 L&A Multiple Punch, 100 Tons, 72" between housings

6"x6⅝" SOUTHWARK Double Angle Shear

SCHULTZ - NAUMANN Beam Shear, 20", 60 lb. and smaller

60" Throat, 8" x 1 1/16 LONG & ALSTATTER Shear

54" Throat 1⅜"x1⅛" HILLES & JONES Punch

42" Throat, 1¾"x1" HILLES & JONES Punch, M.D.

4" LANDIS Pipe Threading Machine

6" BIGNALL - KEELER Duplex Pipe Machine

10" STANDARD Pipe Threading Machine

4" BAKER Heavy Duty Automatic Tapping Machine

#0 BAKER Keyseater, M.D.

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.
1759 North Broadway, Albany 1, N.Y.
N. Y. Office: 50 East 42nd St.

MOREY
Dependable Used Machines

DEFIANCE No. 25A Horiz. Boring Mill—3¾" bar—Built in 1941
N.B.P. 38"-44" Vertical Turret Lathe; side head
BULLARD 60" Vertical Boring Mill
BULLARD 24" R.P. Vert. Turret Lathe
N.B.P. 96"x90"x15' Planer; 4 heads; DC variable M.D.; box table
N.B.P. 48"x36"x14' Planer; 3 heads; box table; belt drive
GRAY 24"x24"x6' Single Head Planer
GRAY 72"x48"x12' Planer — two heads; belt drive
HAMILTON 42"x42"x20' Planer; 3 heads; DC motor drive
LUCAS 3" bar Horiz. Boring Mill; M.D.
D. & H. 3½" Bar Horiz. Boring Mill
TAYLOR & FENN 6" Spline Miller; M.D.
CINCINNATI #2 Vert. Miller, M.D.
LEES BRADNER #6 Thread Miller
CINCINNATI BICKFORD 6' Plain Radial Drills; M.D.
AMERICAN 3' Radial Drill — motor on arm, triple purpose
NATCO C-13 Hyd. Multiple Drill
COLBURN D-3 Drill Press — Capacity 3"
NORTON 14"x72" Plain Grinder
NORTON 15"x15"x72" Openside Surface Grinder
LANDIS 20"x220" Plain Grinder;
LANDIS #3½ Int. Hydraulic Race Grinder
DIAMOND #4 Surface Grinder; Hyd. Feeds
HEALD #60 Internal Grinder; M.D.
GLEASON 6"-18" Bevel Gear Generators
ESPEN LUCAS No. 138 Cold Saw — Cap. 12"
SAUNDERS 8"-18" Pipe Threader
TREADWELL 12" Pipe Machine
GISHOLT Precision Balancer
100 Ton Horiz. Hydraulic Forcing Press
CINCINNATI Gear Burnisher; M.D.
GOULD & EBERHART 24" Shaper — motor drive
LYND FARQUHAR 26" Planer Type Shaper
SLEEPER & HARTLEY Casing Coiling Machine—Series 319

THIS IS A PARTIAL LIST
Send us your specific inquiries

MOREY MACHINERY CO., Inc.
410 BROOME ST., NEW YORK

OTT MACHINERY SPECIALS

AUTOMATICS, Acme, Model C—9/16" M.D.
AUTOMATICS, Gridley, 9/16" & ⅝" Model G
AUTOMATICS, Gridley, 2¼, 3¼ & 4¼" S.S.
AUTOMATICS, Cleveland, 1¼, 1½, 2¾ & 3¾"
AUTOMATICS, Cleveland, ⅝, 1¼ & 2½" Mod. B
AUTOMATICS, Cleveland, 1¼ & 1½" Model M
AUTOMATICS, Cleveland, 3½" Model K4
AUTOMATICS, Cone 1¼ & 1½" 4 spdles, M.D.
AUTOMATICS, New Britain #22 M.D.
AUTOMATICS, Potter & Johnston #5A & 6A
DRILLS, Baker Heavy Duty, #5 M.T.
GEAR HOBBERS, #5A Lees Bradner, M.D.
GEAR HOBBERS, #3 and 12 Barber-Colman
GEAR SHAPERS, #7 High Speed, M.D. & #61
GRINDER, Blanchard #16 A.B. 5, 30" x 18" Magnetic Chuck, M.D.
GRINDER, Brown & Sharpe #10 & 12 M.D.
GRINDERS, Landis, 6" x 18" Plain M.D.
MILLING MACHINES, Becker Vertical, Model S. D. 40" Rotary Table
MILLING MACHINES, Becker Vertical #3 & 5.

OTT MACHINERY SALES, INC.
542 Second Avenue
Detroit 26, Mich.

MONA MEMBER

BORING MILLS

10', 60" Niles Vert.
4½" Niles Horiz.
54", 62" Colburn Vert., M.D.
36" Niles
36" Bullard V.T.L., M.D.
42" Bullard, M.D.
2½" Binsee, Universal M.D.

CANAL MACHINERY COMPANY
176 LAFAYETTE STREET, NEW YORK, N.Y.

SCREW MACHINES

NEW BRITAIN ⅝", 1", 1⅝" six spindle auto, M.D.
BROWN & SHARPE #0, #2, auto, M.D.
CLEVELAND ¾" cap. single spindle.
BLISS & ADRIANCE single and double action pressure.

MONA MEMBER

National Machinery Exchange
"If It's Machinery—We Have It"
134-138 Mott St., NEW YORK, N. Y.

GRINDERS

ABRASIVE No. 6 SURFACE GRINDER, 14" x 60" x 14", motor driven, coolant pump, magnetic chuck, wet grinding attachment, new in 1939.

LANDIS 22" x 96" Plain Cylindrical GRINDER.

AMERICAN 24" x 12' ENGINE LATHE, motor driven, taper attachment, chuck, standard accessories. Excellent condition.

MACHINERY AND ELECTRIC MOTORS CO.
819 W. Lake St. Chicago 7, Ill.

FOR SALE

Pratt & Whitney 14" x 36" Vertical Spindle Ball Bearing Grinder, Model B, Serial #945, motor drive including motor and 11" x 34" magnetic chuck. Excellent condition.

OGDEN R. ADAMS
264-268 State Street Rochester, N. Y.
Tel. Main 6374-5

20′ BARNES HONING

IMMEDIATE DELIVERY FROM OUR STOCK

PRACTICALLY NEW

No. 6 BARNES HYDRAULIC HORIZONTAL HONER

6″ diameter capacity.
20′ spindle stroke.
Table working surface 22′ x 40″.
Maximum swing 40″.

This machine is complete with extra hones, blades, cradle supports, extension bars, Vickers hydraulic pump and coolant motor and pump.

We invite your personal inspection. ***Wire — Write — Phone***

EMERMAN MACHINERY COMPANY

875 W. 120th STREET **CHICAGO 43, ILL.**

BUTT WELDERS

WINFIELD

200 KVA. 60 Cy. 220 or 440 volts.
300 KVA. 60 Cy. 440 volts.

Limited Service.
Immediate Release.

GALBREATH MACHINERY CO.
306 Empire Bldg., Pittsburgh 22, Pa.

UNUSUAL VALUES

Belt Cutter 1″ capacity, 3 spindle
Brake Robinson 5′ toggle
Compressor, 120 Schramm, portable
Drill, near 10″ Buffalo bench
Drill, ceiling suspended, unlimited drilling area
Drill Press, 20″ three spindle Barnes
Drill, six-spindle Henry & Wright, 12″ overhang
Drill, two spindle sensitive, #1 Morse taper
Grinder, #20 Bryant deep hole internal
Grinder, Sellers Tool
Hammer, 30# Bradley upright helve
Kelley, 16″ back geared shaper
Lathe, 24″ x 18′ Steptoe-McFarlan
Lathe, 18″ x 8′, also 20″ x 8′ Bradford
Pipe Machine, 8″ Oster, motor drive
Press, #8-7 Zah-Hahnemann straight side grd.
Press, #1 open back inclinable, motor drive.
Punch & Shear, two ½″ capacity
Threading Machine, #0 Webster & Perks
Turret Lathe, L & D brass, cross slide turret
Vacuum Cleaners, heavy duty for shop use

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

GRINDERS

Lees Bradner Gear Grinder.
Simplicity Piston Grinder.
12″ x 96″ Landis Plain, S.C.

GEAR MACHINERY

18″ Gleason Bevel Gear Generators.
6″ Bilgram Bevel Gear Generator.
#4—36″ B & S Automatic Gear Cutter.
Lees Bradner Gear Grinder.
#6 Fellows Gear Shaper, Cone.
#3 Adams Farwell Gear Hobber.
#2 Pfarter Gear Hobber.
#18H Gould & Eberhardt Gear Hobber.

PLANERS

42″ x 42″ x 20′ Cincinnati Hypro, 4 Heads, D.C. drive.
72″ x 60″ x 28′ Pond 2 heads, Belt drive.
24″ x 24″ x 6′ Gray Planer.
26″ x 26″ x 8′ Woodward & Powell, 2 Hds.

RADIAL DRILLS

2½′ American Plain, M.D.
3′ American Sensitive.
3′ American Plain.
3′ Cincinnati Bickford Plain Radial Drill.
4 Spindle Sipp, Power Feeds.

LATHES

18″ x 8′ Lodge & Shipley, 3 S.C.D. D.B.G.
18″ x 10′ American Geared Head. S.P.D.
22″ x 10′ LeBlond 3 S.C.D. Q.C.
26″ x 15′ Pittsburgh, 3 S.C.D. Q.C.

MISCELLANEOUS

14″ Niles Slotter.
#4 Cincinnati Vert. High Power Mill, M.D.
#2B Brown & Sharpe Plain Miller, S.P.D.
#2 Cincinnati H.P. Universal Miller, S.P.D.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second St., Cincinnati, Ohio

IF YOU ARE DOING DEFENSE WORK

Send for Our Latest Circular Covering Bargains in Small Tools Such as Drills, Reamers, Turret Attachments, etc.

D'EWITT TOOL COMPANY
173 Grand St. New York City

MISCELLANEOUS MACHINES

1—10-ton Harnischfeger Traveling Crane, 52′ span, fishbelly type, with two 5-ton trolleys, cab and 35KW motor generator set.

48″x36″x16′ Gray Dbl. Housing Planer, 3 hds., 15 HP, A.C. m.d.

48″x48″x14′ Gray Dbl. Housing 5pur Grd. Planer, with 4 hds., incl. 25 HP, A.C. motor.

12″x18″ Cinci. Plunge Cut Grinder, A.C. m.d., 20″x8″ face wheel, rebuilt.

STRONG, CARLISLE & HAMMOND CO.
1392 West 3rd St., Cleveland, Ohio — 2832 East Grand Blvd., Detroit, Michigan

---

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MDNA MEMBER

B. D. BROOKS, INC.
361 Atlantic Ave., Boston, Mass.

Before you buy, sell or exchange machinery of any kind contact us first.

PAUL'S MOTOR & MACHINERY SUPPLY

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6111 Vermont Ave.
DETROIT, MICH.

No. 3-F Gorton Engravers
26″ Libbys with 12¼″ hole in spindle
2—Spindle No. 2 Avey Drills

MDNA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N.Y.

S.A.E. 2330 BARS

Item No.	
100..13/16" Hex. H.R.A.	1600 lbs.
101..⅞" Dia. C.D. H.T.	10000 lbs.
102..⅞" Hex. C.D.A.	lbs.
103..15/16" Dia. C.D.A.	136 lbs.
104..15/16" Dia. C.D. H.T.	18220 lbs.
105..1 15/16" Dia. C.D.N.	1343 lbs.
106..1⅛" Dia. C.D. H.T.	5500 lbs.
107..1 7/16" Dia. H.R.A.	10449 lbs.
108..1 7/16" Dia. C.D. H.T.	11880 lbs.
109..1¼" Hex. H.R.A.	lbs.
110..1 9/16" Dia. H.R.A.	350 lbs.
111..4¼" R.C.S. H.R.A.R.	9000 lbs.

S.A.E. X4130 BARS

112..5/16" Dia. H.R.A.	5365 lbs.
113..⅝" Dia. C.D.H.T.	10223 lbs.
114..15/16" Dia. C.D.H.T.	196 lbs.
115..15/16" Dia. C.D.N.	34438 lbs.
116..1" Dia. C.D.H.T.	21164 lbs.
117..1 1/16" Dia. H.R.A.	1757 lbs.
118..1⅛" Dia. C.D.H.T.	lbs.
119..1 7/16" Dia. C.D.N.	13105 lbs.
120..1⅞" Dia. C.D.A.	1174 lbs.
121..1⅞" Dia. C.D.N.	28800 lbs.
122..1⅞" Dia. C.G.	11048 lbs.
123..3¼" Dia. H.R.A.	749 lbs.
124..3⅜" Dia. H.R.A.	20798 lbs.
125..4" Dia. H.R.A.	lbs.
126..1⅝" sq. H.R.A.	1000 lbs.
127..2½" R.C.S. H.R.A.	21900 lbs.
128..3½" sq. R.C.S. H.R.A.	1470 lbs.
129..4" sq. H.R.A.	182091 lbs.
130..½" x ⅝" C.D.H.T.	110 lbs.
131..½" x ⅞" H.R.H.T.	lbs.
132..¾" x 1" C.D.A.	262 lbs.
133..5/16" x 4" H.R.A.	29503 lbs.
134..⅝" x 1" H.R.A.	977 lbs.
135..9/16" x ⅝" H.R.A.	1084 lbs.
136..⅝" x 1¼" H.R.A.	6500 lbs.
137..⅞" x 1⅛" H.R.A.	16032 lbs.
138..⅞" x 1 5/16" H.R.A.	2070 lbs.
139..⅞" x 1 7/16" H.R.A.	10506 lbs.
140..1" x 1⅛" C.D.H.T.	322 lbs.
141..1 1/16" x 1¼" H.R.A.	965 lbs.
142..1¼" x 1⅞" H.R.A.	6239 lbs.
143..1⅛" x 1 11/16" H.R.A.	6280 lbs.

NE-8739 BARS

144..1¾" Dia.	29362 lbs.

NE-8740 BARS

145..2½" Dia.	19980 lbs.
146..3¾" Dia.	25137 lbs.

S.A.E. X4140 BARS

Item No.	
147..1 3/16" Dia. C.D.H.T.	2097 lbs.
148..1 3/16" Dia. H.R.A.	5290 lbs.
149..1 11/16" Dia. H.R.A.	115000 lbs.
150..1 11/16" Dia. C.D.A.	121565 lbs.
151..2⅛" Dia. H.R.A.	47733 lbs.
152..4" Dia. H.R.A.	
153..3" sq. H.R.A.	427 lbs.
154..6" sq. H.R.A.	5652 lbs.
155..⅞" x 1½" C.D.A.	7800 lbs.
156..⅞" x 1½" H.R.A.	8625 lbs.
157..⅛" x 2⅝" H.R.A.	17969 lbs.

CHROME NICKEL BELGIAN STEEL (4% NICKEL)

210..3209 C.N. Bar	855 lbs.
211..3209 C.N. Bar	465 lbs.
212..4035 C.N. Bar	8650 lbs.
213..1.378 C.N. Bar	2334 lbs.
214..1.496 C.N. Bar	2247 lbs.
215..1.575 C.N. Bar	476 lbs.
216..2" Dia. C.N. Bar	1127 lbs.
217..2 3/16" Dia. C.N. Air Hard Bar	1637 lbs.
218..2⅛" Dia. C.N. Bar	553 lbs.
219..2⅜" Dia. C.N. Bar	246 lbs.
220..4.72" Dia. C.N. Bar	2814 lbs.
221..4.92" Dia. C.N. Bar	1689 lbs.
222..5⅜" Dia. C. N. Bar	2244 lbs.
223..6" Dia. C.N. Bar	2114 lbs.
224..6¼" Dia. C.N. Bar	1607 lbs.
225..8" Dia. C.N. Bar	2300 lbs.

STEEL INGOTS

226..10½" square Steel Ingots (Chrome Vanadium)	

STEEL BILLETS & BARS

227..5/16" Dia. SAE 1040	500 lbs.
228..7/16" Dia. SAE 3245	1009 lbs.
229..9/16" Dia. SAE 3140	239 lbs.
230..⅝" Hex. SAE 2320	958 lbs.
231..1" Dia. Nickel Steel Spec. 46C-23	341 lbs.
232..1 1/16" Dia. SAE 1314	1813 lbs.
233..1⅛" Dia. C 1118	9069 lbs.
234..1⅜" Dia. SAE 1314	580 lbs.
235..1 7/16" Dia. SAE 3115	1016 lbs.
236..1½" Dia. SAE 3312	
237..1⅝" Dia. S.A.E. 3312	421 lbs.
238..⅜" Dia. CNMV	16676 lbs.
239..4" square X4135 Billets	

STEEL BILLETS & BARS (Con't.)

Item No.	
240..5⅝" Dia. SAE 3145 Bar	
241..Steel Ingots SAE 6135	480 lbs.
244..7/16" Hex. C.M.S. Billet	5379 lbs.
245..½" Dia. N.S. Bar	2845 lbs.
246..⅝" Hex. N.S. Bar	1013 lbs.
247..⅞" Hex. C.M.S. Billets	9367 lbs.
248..1" Hex. C.M.S. Billets	1567 lbs.
249..1 1/16" Hex. N.S. Bar	441 lbs.
250..1 1/16" Hex. C.M.S. Billets	7996 lbs.
251..1⅛" Dia. N.S. Bar	3314 lbs.
252..1 7/16" Hex. N.S. Bar	3914 lbs.
253..1½" Hex. C.M.S. Billets	3271 lbs.

S.A.E. X4140 CHROME MOLY STEEL BARS

254..1 25/32" x 6 9-16" H.R.A.	25000 lbs.
255..1" x 1½" H.R.A.	31111 lbs.
256..1" x 1⅝" H.R.A.	3432 lbs.
257..1½ x 1 5/16" H.R.A.	
258..1½" x 3½" H.R.A.	10637 lbs.
259..1¼" x 3½" H.R.A.	1376 lbs.
260..2" x 2⅜" H.R.A.	973 lbs.
261..2½" x 4" H.R.A.	119 lbs.
262..2½" x 7½" H.R.A.	146 lbs.
263..2⅜ x 17" H.R.A.	450 lbs.
264..3" x 3½" H.R.A.	560 lbs.
265..5" x 6" H.R.A.	194 lbs.

S.A.E. X4340

266..1¼" Dia. H.R.A.	415 lbs.
267..2½" Dia. H.R.A.	12031 lbs.
268..2⅜" Dia. C.D.N.	5090 lbs.
269..1¼" Hex. C.D.N.	
270..11/16" x 4" H.R.A.	11064 lbs.
271..4" square H.R.A.	
272..6" square H.R.A.	
273..1" Hex. C.D.N.	3139 lbs.

STAINLESS STEEL BARS

282..⅝" square (18-8) C.D. mill lengths 16/20'	74884 lbs.

ELECTRIC FURNACE AIRCRAFT QUALITY X4130

296..¼" dia. C.D. Norm.	200 lbs.
297..3/16" dia. H.R. Ann.	1000 lbs.
298..9/16" dia. C.D. 125,000 psi	5000 lbs.

ELECTRIC FURNACE AIRCRAFT QUALITY (Continued)

X-4130

Item No.	
299..⅝" dia. C.D. Norm.	18000 lbs.
300..⅝" dia. C.D. Ann.	651 lbs.
301..⅝" dia. H.R. Ann.	164 lbs.
302..13/16" dia. C.D. 125,000 psi	12000 lbs.
303..⅞" dia. C.D. H.T.	
304..1" dia. C.D. Norm.	10000 lbs.
305..1 1/16" dia. C.D. Norm.	
306..1⅛" dia. C.D. Norm.	6647 lbs.
307..1 5/16" dia. C.D. Norm.	10000 lbs.
308..1 5/16" dia. H.R. Ann.	6180 lbs.
309..1⅝" dia. H.R. Ann.	1854 lbs.
310..2" dia. H.R. Ann.	
311..2¼" dia. C.D. Norm.	
312..¾" square C.D. Ann.	3960 lbs.
313..1¼" square H.R. Ann.	5810 lbs.
314..1/16" hex. C.D. Ann.	1400 lbs.
315..11/16 hex. C.D. Norm.	290 lbs.
316..⅝" x ⅞" H.R. Ann.	1627 lbs.
317..1½" x 1 5/16" H.R. Ann.	805 lbs.
318..1½" x 3¾" H.R. Ann.	69376 lbs.
319..1⅝" x 1¾" H.R. Ann.	3744 lbs.

4140

320..3/16" dia. H.R. Ann.	3000 lbs.
321..⅝" dia. C.D. Norm.	4000 lbs.
322..⅝" dia. C.D. Norm.	15000 lbs.
323..⅝" dia. C.D. 125,000 psi	8396 lbs
324..13/16" dia. C.D. 125,000 psi	5000 lbs.
325..⅞" dia. C.D. Norm.	5000 lbs.
326..15/16" dia. C.D. Norm.	10000 lbs.
327..1" dia. C.D. Norm.	25000 lbs.
328..1 3/16" dia. C.D. Norm.	15000 lbs.
329..1⅜" dia. C.D. Norm.	8000 lbs.
330..2⅛" dia. C.D. Ann.	7926 lbs.
331..13/16" x 1⅛" H.R. Ann.	11656 lbs.

X-4340

332..1 7/16" Hex. C.D. Norm.	27024 lbs.
333..1 11/16" Hex. C.D. Ann.	14410 lbs.

2330

334..3/16" dia. H.R. Ann.	3835 lbs.
335..¼" dia. C.D. Norm.	2500 lbs.
336..5/16" Hex. C.D. Norm.	2381 lbs.
337..⅜" dia. C.D. Norm.	2000 lbs.
338..⅝" dia. C.D. Ann.	3133 lbs.
339..7/16" dia. C.D. Ann.	5000 lbs.
340..7/16" Hex. C.D. Ann.	15000 lbs.
341..½" Hex. C.D. Norm.	7000 lbs.
342..9/16" Hex. C.D. Ann.	12000 lbs.
343..9/16" Hex. C.D. Norm.	25000 lbs.
344..11/16" dia. C.D. Ann.	2000 lbs.
345..⅝" dia. C.D. Norm.	8000 lbs.
346..1" dia. C.D.	6020 lbs.

For immediate shipment from New York stock.

NORTHEASTERN STEEL COMPANY

352 GROVE STREET
BROOKLYN 27, N. Y.

Tel. No. — GLenmore 2-6352, 3, 4 Write, telephone, or telegraph

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GOOD MACHINES

Immediate Shipment!

KEARNEY & TRECKER, No. 3K Plain Vertical Mill; motor in base; late type machine, dial type feeds and speeds.

KEARNEY & TRECKER No. 1H-18 Plain Mfg. Type Mill; motor in base; late type machine.

GISHOLT 42" Vertical Boring Mill; 2 swivel heads on rail, single pulley gear box drive, geared feeds.

UNIVERSAL 2½" Table Type Horizontal Boring Bar; geared feeds, single pulley drive.

MOLINE 5D Hole Hog; 4 spindles, No. 5 taper, motor driven.

NILES 45" x 20' Geared Head Heavy Duty Engine Lathe; arranged for geared motor drive.

SIDNEY 14" x 8' Geared Head Lathe; motor drive.

INGERSOLL 36" x 36" x 10' Fixed Rail Planer Type Milling Machine; with 3 horizontal and 2 vertical spindles, M.D.

CINCINNATI No. 4 Plain Milling Machine; cone head with vertical attachment.

POND 84" x 72" x 20' Planer; 4 heads, with D.C. reversing motor drive and controls.

NILES 16" Slotter; 30" rotary table, belt drive.

Partial Listing

ACME EQUIPMENT CO. MONA MOTORS

126-128 S. Clinton St., Chicago 6, Ill.

STEAM DROP HAMMER—1500#
6" AJAX FORGING AND UPSETTING MACHINE, MD
PLATE PLANER—Hilles & Jones 15 ft.
BULLDOZER—#7 AJAX Crosshead 14" x 64"
HIGH SPEED SAW AND BURRING MACHINE—Ajax #3 30"
PIPE BENDING MACHINE—Hydraulic—Capacity 8" Extra Hy. Pipe
SANDSLINGER—Beardsley & Piper Motive Type 7 cu. ft. capacity
H. J. KOONTZ, Massillon, Ohio, Phone 8188

MILLER

INGERSOLL 24"x30"x8' Table, Planer Type Production Miller with Vertical Head and 2 Side Heads, Adjustable Rail. Direct Motor Driven with new 25 H.P. Motor & Controls. Can be seen in operation.

MECANO SHIP REPAIR CORP.
68-70 Fleet Street Jersey City, N. J.

FOR SALE
Coulter Diamond Boring Machine

Vertical, single spindle, complete with 5 HP, 440 volt, 3 phase drive with starter and work hold down—can finish bore holes up to 4" dia. by 3" deep. Machine ready to run.

THE OHIO ELECTRIC MFG. COMPANY
CLEVELAND, OHIO

FOR SALE in Houston, Texas

J. & L. 2¼ bar stock turret lathe S. & M. 15" shaper. Both in excellent condition.

FS 810 AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

FOR SALE
BLUEPRINT MACHINE

One vertical, double glass, cylinder type blueprint machine for 220 Volt 60 Cycle current, Pease carbon, are lighted with companion resistor. In good working condition. Will print 46" square prints.

TRIPLEX HEATING SPECIALTY CO.
Peru, Indiana

WANTED

WE WANT . . . TAPS TWIST DRILLS — FILES CUTTERS — END MILLS SAWS — HACK SAW BLADES.

WE BUY SURPLUS STOCKS OF TOOLS.

SURPLUS TOOL EXCHANGE

617 W. Randolph St., Chicago 6, Ill.

WANTED

The following latest type machine tools in A-1 condition:
Engine lathe 16" x 10' thread cutting
Engine lathe 30" x 10' thread cutting and rapid traverse.
Radial drill 6' arm x 15" or 17" column with rapid traverses.

W-813 AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

New "SEARCHLIGHT" Advertisements

must be received by 10 A. M. Thursday to appear in the issue out Thursday of the following week.

Address copy to the Departmental Staff

American Machinist
330 West 42nd St., New York City

Latest Type Machines for Immediate Shipment

NO PRIORITY REQUIRED

Machines 2 to 3 years old

1 — No. 28-60 Cincinnati Vertical Hydrotel Milling Machine, motor drive, with A.C. 220 volt, 3 phase, 60 cycle electrical equipment. Machine is equipped with spindle reverse, extended cross travel of ram, extended vertical range, power feed to vertical head, coolant pump

1 — No. 34-36 Cincinnati Plain Hydromatic Miller, with A.C. motors

1 — No. 3-24 Cincinnati Plain Hydromatic Miller, with A.C. motors

1 — No. 34-36 Cincinnati Plain Hydromatic Miller, with A.C. motors

1 — No. 4-36 Cincinnati Plain Hydromatic Miller, with A.C. motors

4 — No. 34-36 Cincinnati Duplex Hydromatic Millers, with A.C. motors

3 — No. 34-36 Cincinnati Duplex Hydromatic Millers, with tracing attachment, A.C. motors

1 — 72" King New Type Heavy Duty Vertical Boring & Turning Mill, motor drive, with A.C. motors. Machine is equipped with right hand swivel turret, left hand swivel ram, right hand side table, plain table, tool lubricating attachment, 1 set of 4-12" steel body face plate jaws.

1 — Type A Barber-Colman Gear Hobber, with A.C. motor

1 — 10x96" Landis Type C Plain Cylindrical Grinder, with A.C. motors

2 — No. 4DE Potter & Johnston Automatic Chucking and Turning Machines, with A.C. motors, chucking equipment.

1 — 6 spindle Edlund Drill, m.d. with power feed

1 — 6 spindle Avey Drill, m.d.

We carry an average stock of 1,000 machines. Send us your inquiries.

THE EASTERN MACHINERY COMPANY

1004 TENNESSEE AVE. **CINCINNATI, OHIO**

3—No. 00 Brown & Sharpe Automatic Screw Machines with slotting attachments. Serial numbers over 6000.

Inland Machinery Company

48 So. Clinton St. Chicago, Ill.

#0 GIDDINGS & LEWIS HORIZONTAL BORING MACHINE

3⅛" diameter of spindle; #5 Morse taper Single pulley drive through gear box; 24"x46" table; 84" from spindle nose to support; Star facing attachment; rotary power feed table; 10 assorted boring bars.

BARRON MACHINERY COMPANY

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#452 New Britain Chucker, m.d.
2—4½" Cleveland Chuckers, m.d.
2—#33 Kempsmith Millers
2—#4 Cincinnati Vertical Millers
#3B Kearney & Trecker Vertical, m.d.
#2 B & S Vertical, m.d.
Newton 2 sp. Rotary Miller
#3A Warner & Swasey Turret Lathe
#2B Foster Turret Lathe
36" Morton Draw-cut Shaper
5' Western Radial Drill
#40 United sliding frame Hot Saw, motor driven, with motors. Capacity, 36" blades.
3" Binsse Horizontal Boring Mill
5" Beaman & Smith floor type Boring Mill, m.d.
#2 Brown & Sharpe Universal Grinder
6" x 18" Cincinnati Grinder, m.d.

VICTOR MACHINERY CO.

MONA MEMBER

135 So. Clinton Street
CHICAGO 6, ILLINOIS

GRINDERS

No. 79 Gardner, 72", M.D.

50"x28' Norton Roll, M.D.

Norton 12x18", M.D.

Modern 12x18", M.D.

Heald No. 72A Hydraulic M.D.

P. & W. 14", 18", B.B.

MONA MEMBER

AARON MACHINERY CO.

45 CROSBY STREET NEW YORK, N.Y.

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DUE TO CHANGE IN MANUFACTURING FACILITIES, WE HAVE BEEN AUTHORIZED TO DISPOSE OF THE FOLLOWING MACHINES BY A LARGE EASTERN MANUFACTURING CONCERN.

ALL MACHINES NOW IN OPERATION!

HEAVY DUTY GEARED HEAD ENGINE LATHES

50"x20' PITTSBURGH, quick change gear, 6 speeds, DC variable speed drive.
(2) 36"x16' PUTNAM, quick change gear, 18 speeds, DC variable speed drive.
48"x26' PUTNAM, 4 speeds, 16' centers, DC variable speed drive.
48"x34' PUTNAM, 4 speeds, 26' centers, DC variable speed drive.
48"x24' NILES BEMENT POND, 4 speeds, power rapid traverse to carriage, DC variable speed drive.
36"x22' BRIDGEFORD, 9 speeds, DC variable speed drive.

IMMEDIATE DELIVERY!

BORING LATHES

36"x34' LEBLOND, GEARED HEAD
(2) 34"x30' SPRINGFIELD, GEARED HEAD

NEWTON HEAVY DUTY COLD CUT-OFF SAW, 16" cap.
(2) 10'x6" GEO. OHL PRESS BRAKES, 3/16" cap.
6' DRESES RADIAL DRILL
36" FOSDICK RADIAL DRILL
#2 SNYDER UPRIGHT DRILL PRESS
SCHULSE & NAUMANN COPING MACHINE
#156 NIAGARA PUNCH
36" ATLANTIC BAND SAW
#5½ HILLES & JONES SINGLE END SHEAR

35 T. BALDWIN STEAM LOCOMOTIVE, SADDLE TANK

CRANES

25 T. ALLIANCE OVERHEAD ELEC. TRAVELING CRANE
10 T. BOX CRANE, 230 v. D.C.

A COMPLETE DETAILED AND ILLUSTRATED CIRCULAR IS NOW BEING PREPARED, WE SUGGEST YOU APPLY IMMEDIATELY FOR YOUR COPY! ARRANGE FOR INSPECTION NOW!

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Cold forgings—just a few of the unusual shapes and sizes from the "good, rich earth" of Allied craftsmanship! Only years of careful cultivation of precision machinery and workmanship could make them possible.

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ALLIED PRODUCTS CORPORATION

Executive Offices: 4646 Lawton Ave. Detroit 8, Mich.

All four plants have now added a star to their Army-Navy "E" pennants

"Grow More In '44"

—that's the motto for America's victory gardeners this year. The food situation continues urgent, and the government calls for 22 million victory gardens. Let's all pitch in and help grow our own food. NOW is the time to PLAN a prize victory garden!

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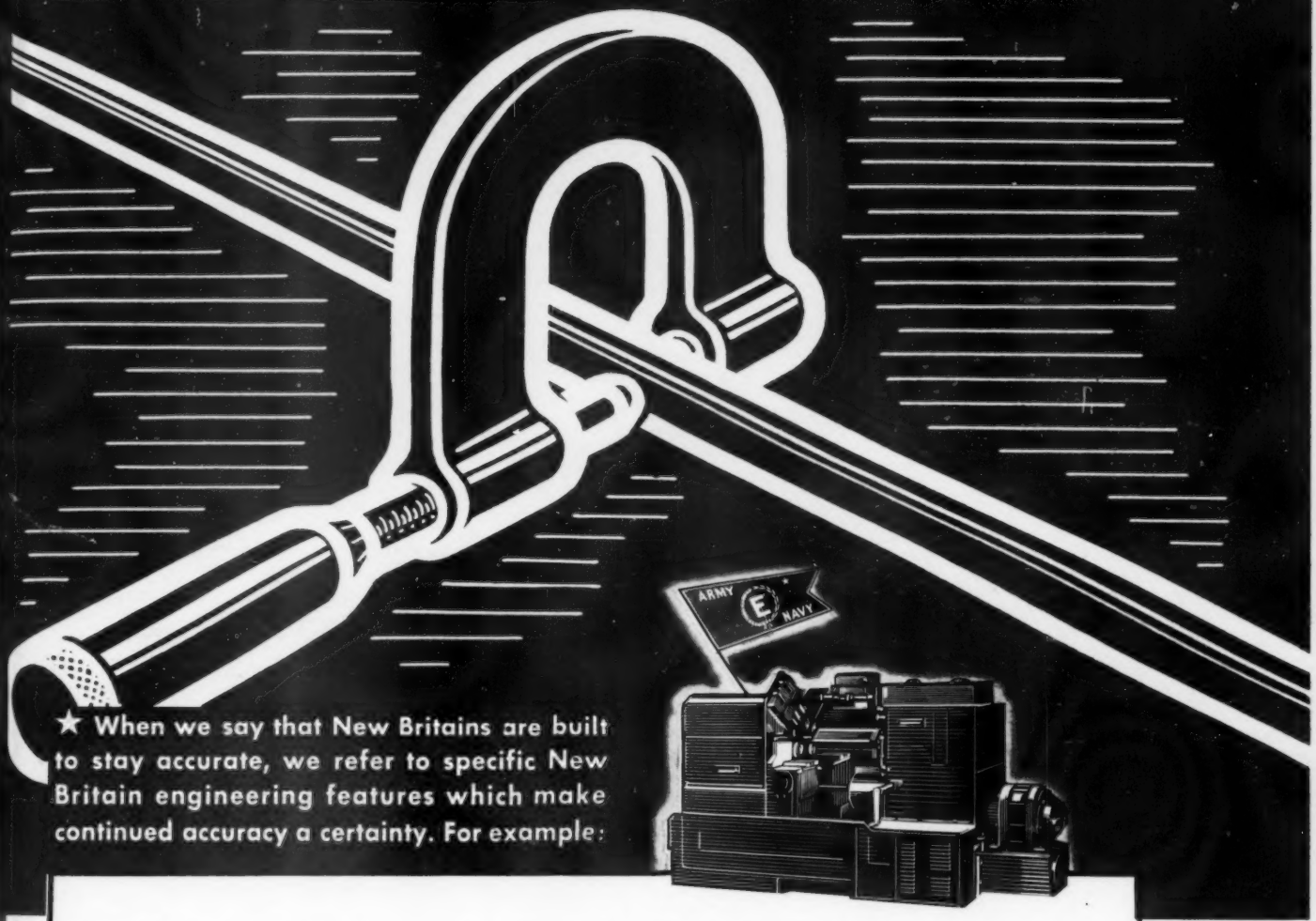

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● **Automatic Spindle Carrier Clamping Mechanism,** which automatically clamps the Spindle Carrier after index, making it in effect part of the frame of the machine, and precluding weaving during the cutting cycle.

● **Tool Slide Stem** finished to extremely close tolerances and kept under the protection of a protective oil film despite extremely heavy pressures, thus eliminating vibration.

● **Cross Slides,** mounted on large diameter hardened and specially finished alloy steel studs, rigidly supported on each end.

● **Cross Slide Cams** directly adjacent to the slides, and connected by short extra heavy forming slide levers, permitting heavy forming advances without vibration.

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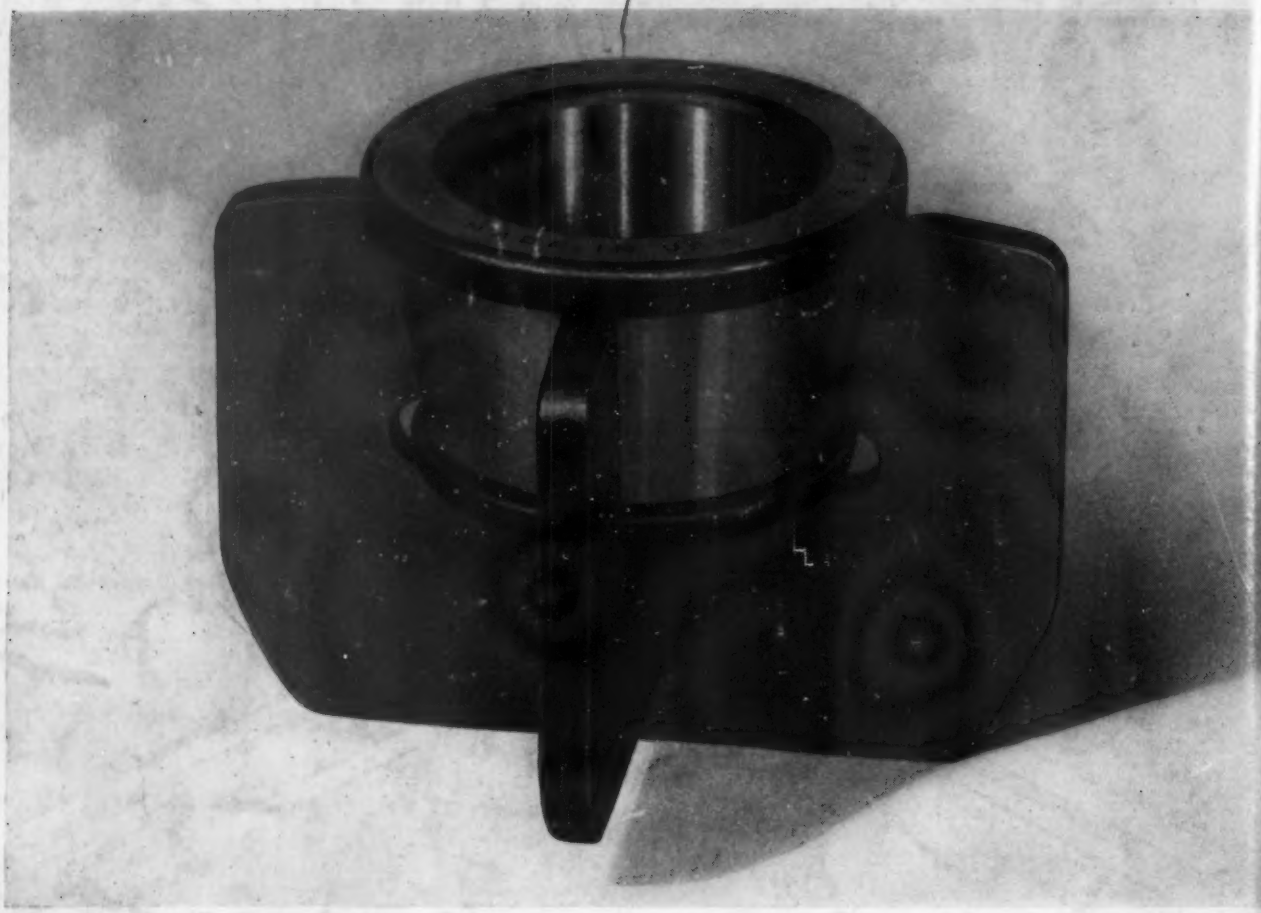

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